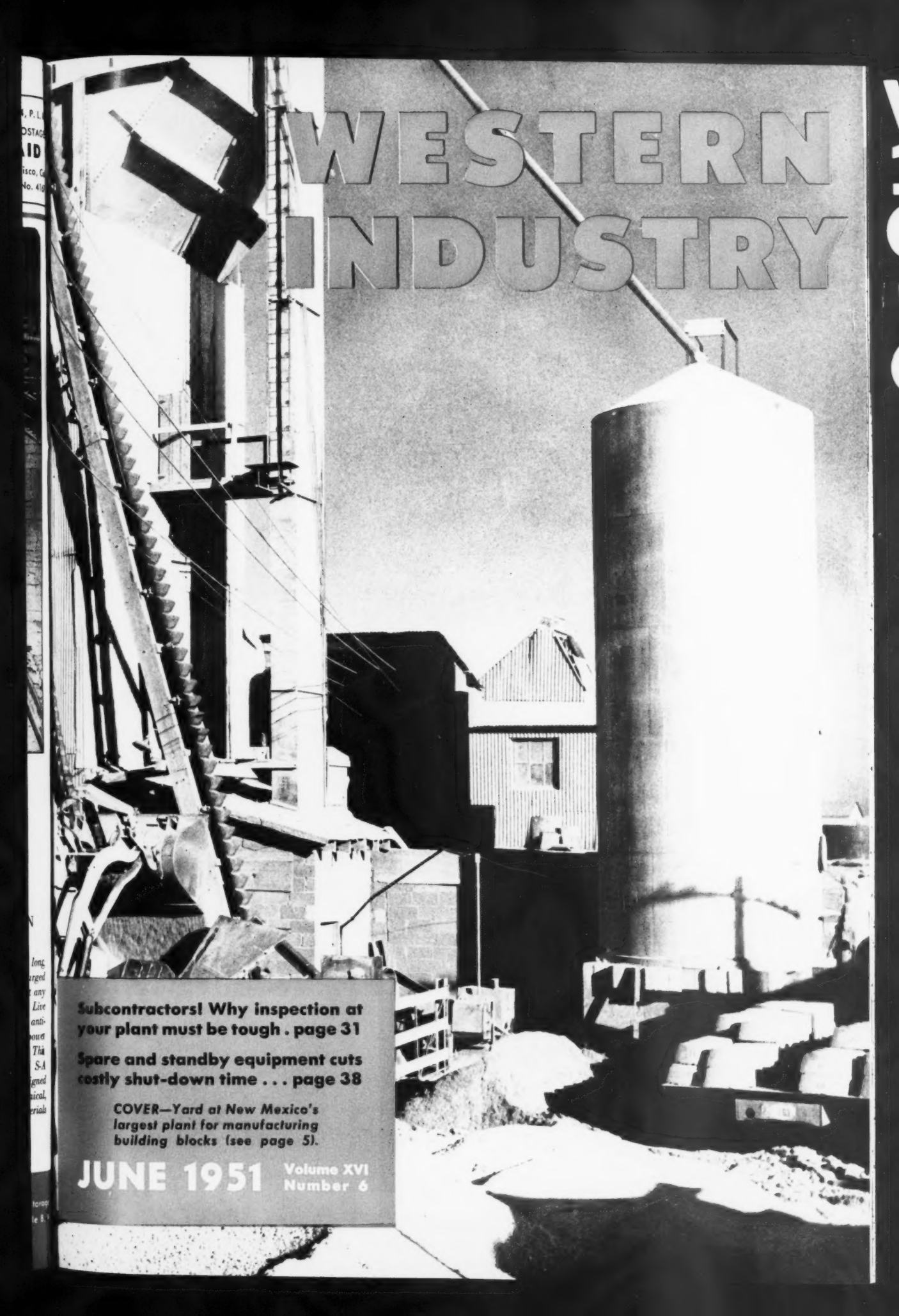


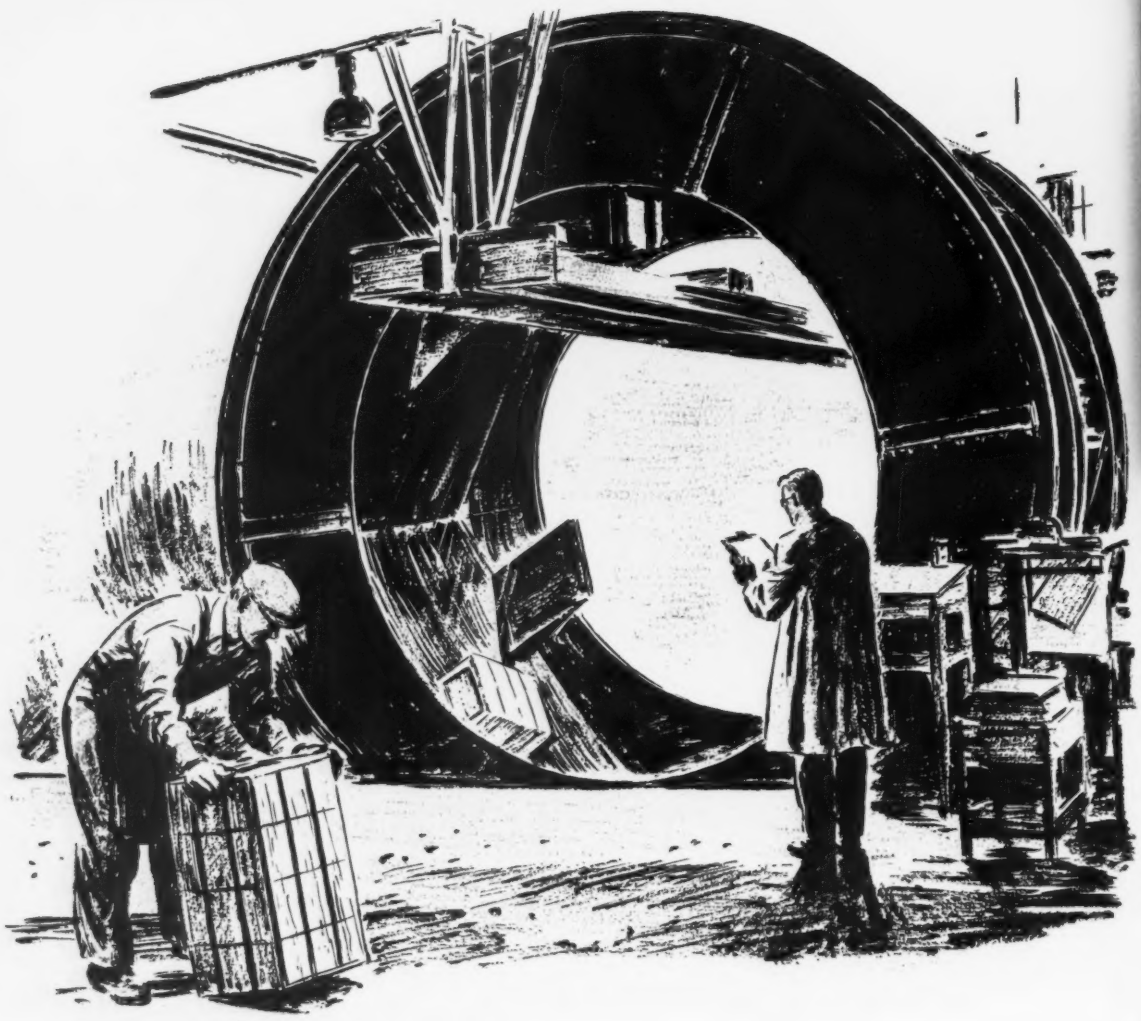
WESTERN INDUSTRY

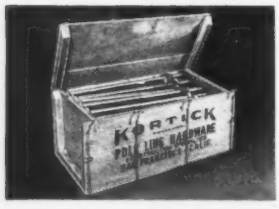
Subcontractors! Why inspection at your plant must be tough . page 31

Spare and standby equipment cuts costly shut-down time . . . page 38

COVER—Yard at New Mexico's largest plant for manufacturing building blocks (see page 5).

JUNE 1951 Volume XVI Number 6





Leaders in pole line hardware industry have standardized on Cabco wirebound boxes for bulk shipments of heavy hardware, castings, forgings. One firm ships 75 lbs. of bolts in Cabco wirebounds weighing 4 lbs. Shippers realize up to 50% savings on container weights with light, strong Cabco wirebounds.

There's more to a CABCO container than wood, wire and price

Nobody demands more of a Cabco container than our own engineers. Before they OK a new type of container, it must pass many severe tests. One is the gruelling "rough handling" test in the huge revolving drum shown here. Every detail is checked and re-checked—dimensions of stout fir slats, size and type of cleats, gauge and spacing of steel binding wires. Each detail must be just right—for *your* purpose.

Precision engineering from start to finish is another reason why Cabco has been the West's foremost designer and supplier of wooden shipping containers since 1883.

CABCO CONTAINERS

A product of the California Barrel Company, Ltd

Sold only by

DUFF CALIFORNIA CO.

100 Bush Street, San Francisco 4 • 2581 E. Eighth Street, Los Angeles 23
501 Dooley Building, Salt Lake City 1

2232

use one of these 6 Reduced Voltage Starters

To prevent damage to many machines or to materials in process, squirrel cage motors often need gradual acceleration. For such applications, one of these reduced voltage starters will provide the desired speed-torque control.

This line of A-B starters is extremely versatile, providing either manual or automatic starting . . . with 2 or 3 step acceleration . . . or stepless control up to full speed . . . to fit the most critical motor starting requirement.

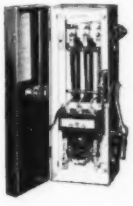
MANUAL—TRANSFORMER TYPE

Manual transformer type starter up to 125 hp, 220 v; 250 hp, 600 v max. Air break or oil immersed contacts. Automatic reset overload relays. Time delay mechanism determines proper time interval for manual switch-over of hand lever.

BULLETIN 646

MANUAL—COMPRESSION TYPE

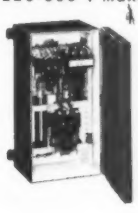
Manual compression resistance starter up to 50 hp, 220-600 v max. Graphite discs in the insulated tubes are compressed with the hand lever for stepless speed control. Ideal starters for chain or belt drives. Overload relay protection.



BULLETIN 640

AUTOMATIC—3 STEP RESISTANCE

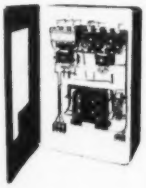
Automatic resistance starter up to 400 hp, 220-600 v max. Accelerates squirrel cage motors in 3 steps. Resistors easily adjusted for ideal starting of motors on power networks. For more than 3-point control, use Bulletin 742 starter, below.



BULLETIN 741

AUTOMATIC—TRANSFORMER TYPE

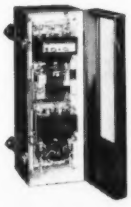
Automatic reduced voltage starter up to 300 hp, 600 v max. An accurate timing relay controls the accelerating time. Operator touches start button—the starter does the rest. Available in standard, watertight, and dust-tight enclosures.



BULLETIN 746

AUTOMATIC—2 STEP COMPRESSION

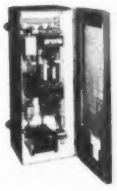
Automatic resistance starter with preset adjustable graphite resistors up to 250 hp, 220-600 v max. Push button closes starting circuit through resistors. Later, timing relay closes running contactor and cuts out the starting resistors.



BULLETIN 740

AUTOMATIC—STEPLESS TYPE

Fully automatic resistance starter with solenoid controlled graphite disc resistors rated up to 500 hp, 220-600 v max. Stepless control of current and speed. Acceleration adjustable to avoid lamp flicker. Overload relay protection.



BULLETIN 742

Write for Bulletins to Allen-Bradley Co., 1316 South Second Street, Milwaukee 4, Wisconsin

A-B Quality

ALLEN-BRADLEY

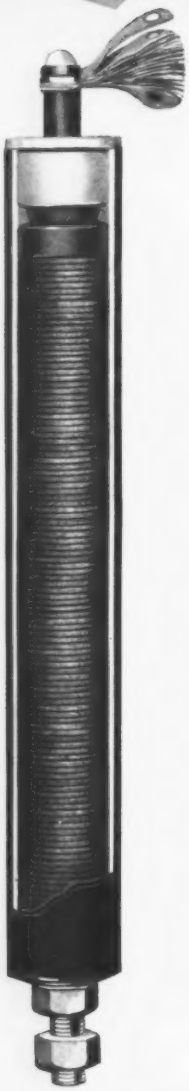
REDUCED VOLTAGE STARTERS

QUALITY

351-MR

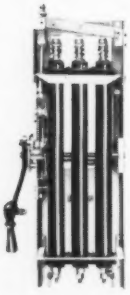
for VELVET SMOOTH ACCELERATION

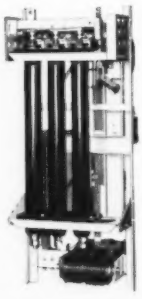
use these Allen-Bradley Starters with Graphite Compression Resistors



Cutaway view of Allen-Bradley graphite resistor tube showing discs, insulating lining, and the pressure terminal.

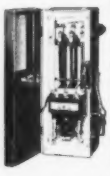
With these Allen-Bradley compression resistance starters you can start squirrel cage motors with such velvet smoothness that there is no voltage dip . . . no lamp flicker. The secret of this stepless acceleration lies in the smooth control of the Allen-Bradley graphite compression resistors which are shown below.





BULLETIN 640 MANUAL
Stepless Resistance Starter

The motor current passes through the graphite disc resistors. Compressing them with the hand lever reduces the starting resistance steplessly until it is shunted automatically by the running contactor.



Bulletin 640 manual starters have a hand lever for manually compressing the resistors. At maximum speed position, a magnetic contactor automatically connects the motor to full voltage.

BULLETINS 740 & 741 AUTOMATIC
2 and 3 Step Resistance Starters

In these two resistance starters the adjustable resistors are arranged in 2 or 3 steps. Each step is cut out, successively, by timing relays. These starters can be easily adjusted for equal current inrush per step.

Bulletin 740-741 starters are rugged, automatic starters.

BULLETIN 742 AUTOMATIC
Stepless Resistance Starter

In this starter, compression of the graphite discs is done automatically by a solenoid mechanism. Absolutely velvet smooth acceleration is obtained. No other starters provide similar stepless control.

Bulletin 742 resistance starters prevent lamp flicker on network systems. They provide automatic stepless starting for machines and processes which are easily damaged by sudden starting.

BULLETIN 646 TRANSFORMER TYPE STARTER

For loads with high starting friction, requiring sudden applications of power, use the Bulletin 646 manual or the Bulletin 746 automatic transformer type starters.

Write for Bulletins to Allen-Bradley Co., 1316 South Second Street, Milwaukee 4, Wisconsin

ALLEN-BRADLEY

REDUCED VOLTAGE STARTERS

QUALITY

A-B Quality

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WESTERN INDUSTRY

VOLUME XVI JUNE • 1951 NUMBER 6

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Save Waste Paper and Boxes
Power of the West

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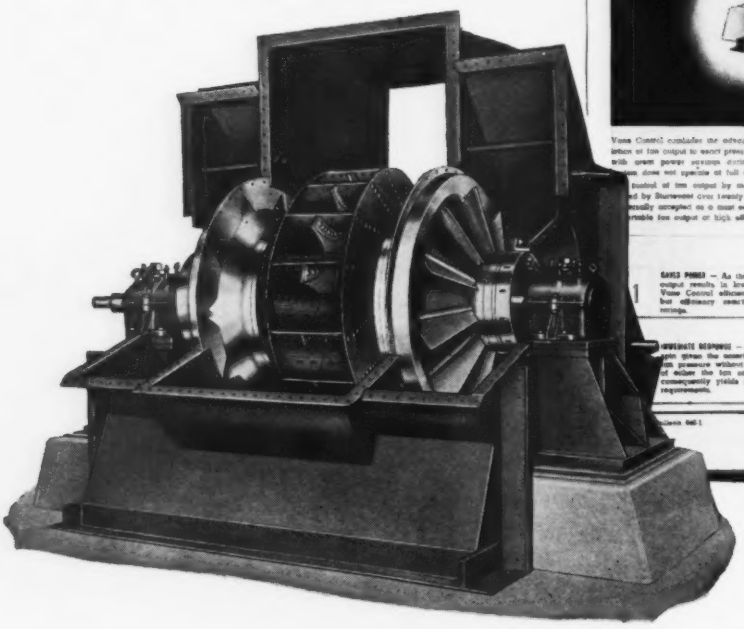
Front Cover

Ancient volcanoes did their part to build up the West without knowing it, for today the ash is used for aggregate. Edgar D. Otto & Son, New Mexico's largest manufacturer of building blocks, whose Albuquerque yard is featured, produces "Lavalite" from an ancient cone on the Isleta Pueblo reservation.

A NEW CATALOG...

ON POWER-SAVING

VANE CONTROL®



Cutaway of a Sturtevant Induced Draft Fan shows VANE CONTROL and the E-R (Erosion Resisting) Wheel.

Just off the press, Descriptive Bulletin DB 92-810 gives you complete information and data on the *new* Sturtevant Adjustable Inlet VANE CONTROL.

This power-saving control has been universally accepted as the economical way to obtain variable fan output at high efficiency.

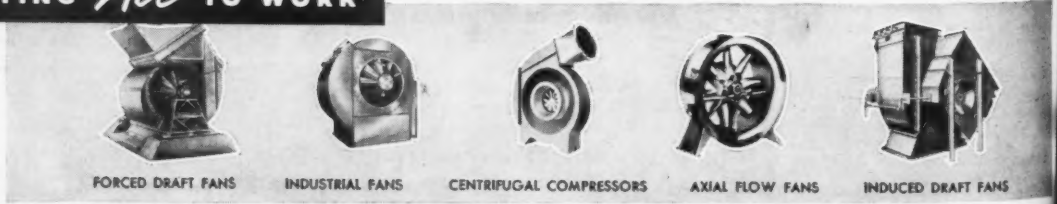
VANE CONTROL's new, easily operable link and lever system is completely outside the gas stream on Induced Draft fans. No abrasive dust ever reaches the operating mechanism.

Sturtevant VANE CONTROL is available for use on Forced Draft fans, Induced Draft fans, Industrial fans, and Centrifugal Compressors. Write today for a free copy of DB 92-810. Address Westinghouse Electric Corporation, Sturtevant Division, 149 Damon Street, Hyde Park, Boston 36, Mass.

YOU CAN BE **SURE**...IF IT'S **Westinghouse**

J-80218

PUTTING *Air* TO WORK



Eyelets?
Eyelet machine products?

Here, illustrated full size, are some examples of the parts we make—in a wide variety of metals and finishes. Some are of simple design . . . others are intricate, precision-made parts for industrial, electrical and scientific purposes.

We'll be glad to quote on your requirements, and have thousands of stock tools which may save tooling-up charges. Just send us a sample, drawing or description, together with quantity and other pertinent information.

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FOR ALL YOUR CUTTING TOOLS, GAGES AND SUPPLIES

These factory trained Cutting Tool Specialists are at your service to give personal attention to your needs for Cutting Tools, Gages and Industrial Supplies.

NOW, from one nearby reliable source you can fill nearly every need for cutting tools, gages, saw bands, machine tools and industrial metal working supplies.

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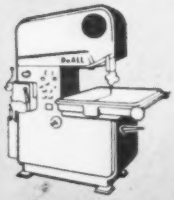
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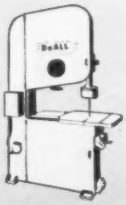
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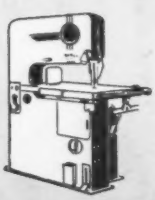
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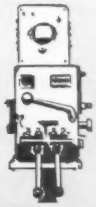


BLADE WELDER

VARIABLE SPEED DRIVES

Bright chapter in the West's growth

A NEW MILL to produce tinplate—critically needed by western can manufacturers—is now under construction by Kaiser Steel.

Scheduled for completion next year, it will add 200,000 tons of tinplate to the West's annual supply—enough for 2 billion cans a year.

This tinplate mill will help greatly to meet the urgent needs of the West's multi-million dollar produce industry. It will provide sorely needed metal to protect military provisions.

This is another chapter in a *continuous* story of expansion by Kaiser Steel . . . resulting in greater production of finished steels listed below. Today, this steel is helping in countless ways to supply military and essential civilian requirements.

More evidence that the West Coast's only integrated, *independent* steel plant is helping to build a stronger West . . . and a stronger nation!

It's good business to do business with

Kaiser Steel

built to serve the West

PROMPT, DEPENDABLE DELIVERY AT COMPETITIVE PRICES • plates • continuous weld pipe • electric weld pipe • hot rolled strip • hot rolled sheet • alloy bars • carbon bars • structural shapes • cold rolled strip • cold rolled sheet • special bar sections • semi-finished steels • pig iron • coke oven by-products

For details and specifications, write: **KAISER STEEL CORPORATION, LOS ANGELES, OAKLAND, SEATTLE, PORTLAND, HOUSTON, TULSA, NEW YORK**

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol Cutting Oil 20-TA

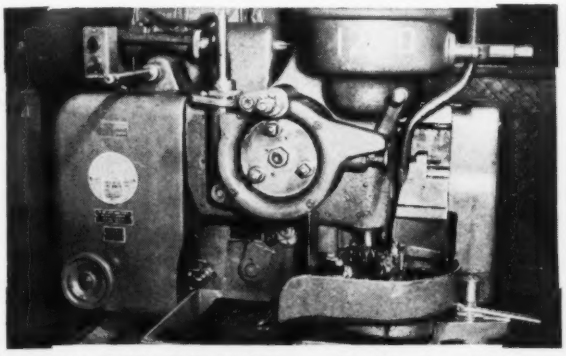
TOOL High-speed gear shaper + others

LUBRICATOR Circulating and hand

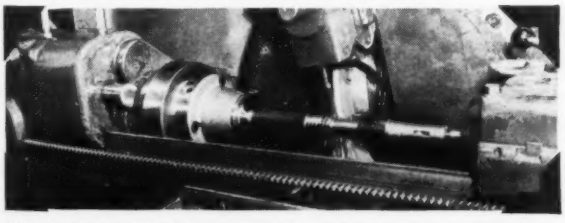
SERVICE Making fuel-burner and engine parts

FIRM Iron Fireman Mfg. Co., Portland, Oregon

Calol cutting oil triples machine-tool life!



THIS HIGH-SPEED GEAR SHAPER, in the big Iron Fireman Manufacturing Co. shop at Portland, Oregon, required a new cutting tool every half day until Calol Cutting Oil 20-TA replaced the comparable type competitive lubricant being used. Now tools on the machine are only changed after 1½ days of use. "Besides three times longer tool life, I get good surface finish at high speeds with Calol Cutting Oil, and it costs me far less than the oil I was using," says Bill Huntley, Maintenance Foreman.



CALOL CUTTING OILS are used in all the many machining operations in Iron Fireman's shop. This includes thread grinding (shown here), shaping, hobbing, drilling, turning and broaching. There is a complete line of Calol Cutting and Soluble Oils to meet every machining condition. They come in four general types: Mineral oils, ready-mixed compounded oils, concentrates and soluble oils.

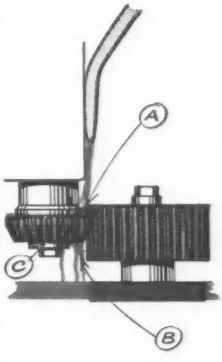
How to increase efficiency in all metal-cutting operations

Use the correct Calol Cutting Fluid for any operation from grinding to broaching. Recommendations for each are made from actual working results.

A. Have high cooling and lubricating qualities—minimize "built-up edge" and promote good finish.

B. Flush away cuttings readily.

C. Protect machine and work against rusting and corrosion.



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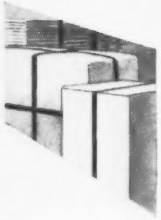
STANDARD OIL COMPANY OF CALIFORNIA

"We like steel strapped shipments . . .

they're more compact — easier to handle and stow" . . . . . says Mr. J. D. Boylan,
Director of Cargo Sales,
AMERICAN AIRLINES



Mr. Boylan, like thousands of persons engaged in shipping products safely throughout the world, knows the advantages that steel strapping offers.

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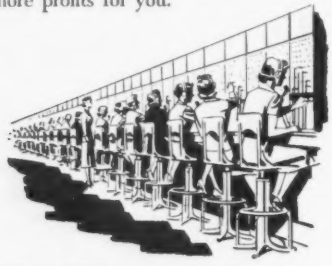
Whether it's theaters, auditoriums, or sports arenas, you can count on American Blower Air Handling Equipment to keep your customers comfortably cool. The combination of American Blower fans and air washers, for example, forms a complete, compact method of comfort cooling large areas at low cost. The fan provides a supply of circulating outdoor air. The air washer cleanses, purifies and freshens the air while removing dust and water soluble odors. End result —a healthy volume of repeat business, more profits for you.



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"Pleasant working conditions" is high on the list of reasons why people like to work for the telephone company. We're proud that many telephone buildings and exchanges around the country use American Blower air conditioning and ventilating equipment to create a fresh atmosphere indoors. They've found, as have many other businesses, that American Blower products provide not only high operating efficiency at low cost but their styling blends well with modern business interiors. Our nearest branch office will gladly furnish you with data and prices.

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Hot lights, plenty of activity and nervous tension call for good ventilation in radio and TV studios. Yet fans must operate quietly to prevent "mike" pickup. The quiet operating feature of American Blower fans makes them ideally suited for jobs like this. American Blower Sirocco Fans, for example, deliver more air per revolution than any other type fan, operate at lower tip speeds (making them unusually quiet), and save power.

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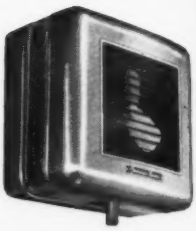
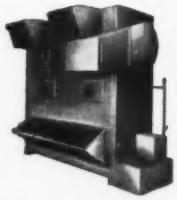
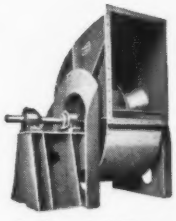


Unit Heaters

Ventura Fans



Air Conditioning Equipment



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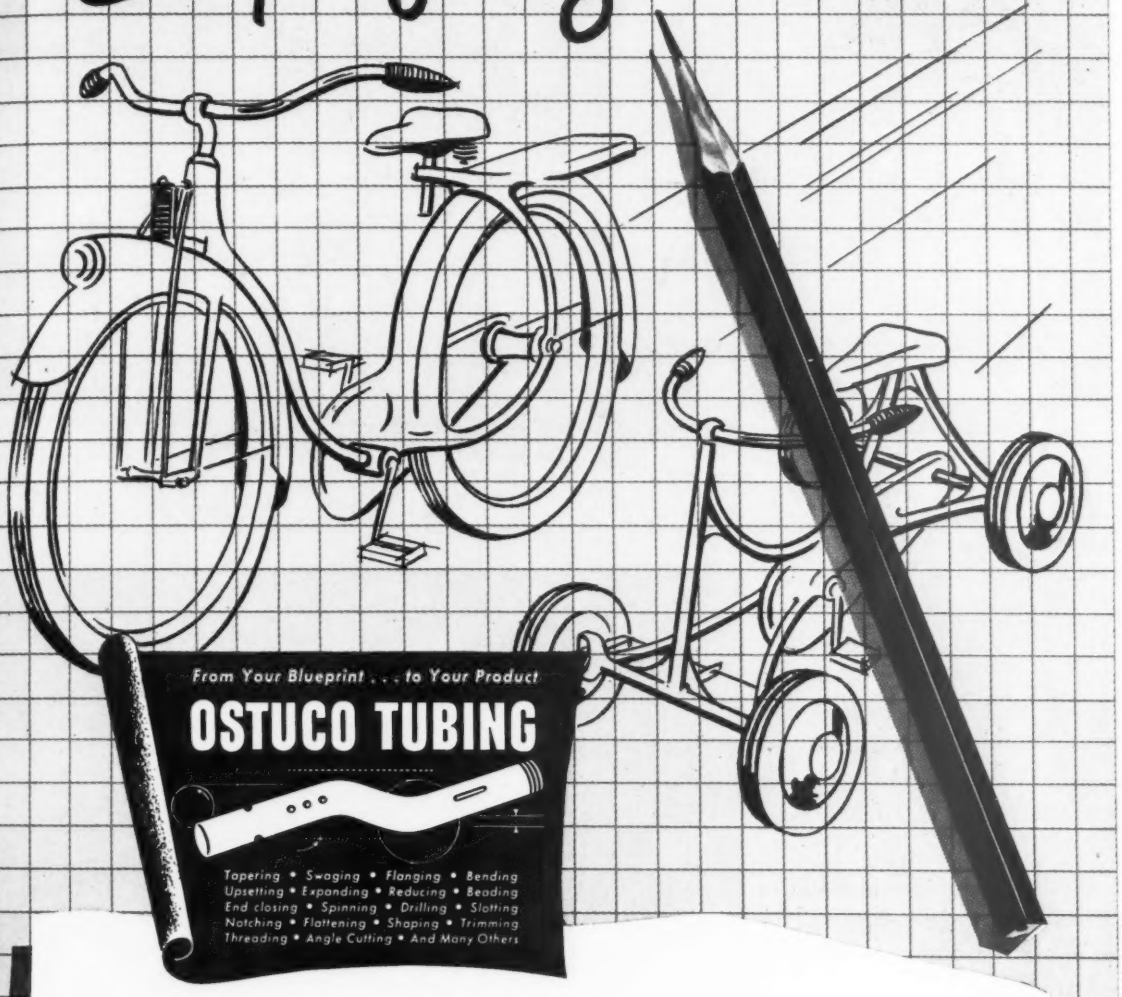

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In exploring future product possibilities, give consideration to versatile OSTUCO Steel Tubing. Advantages are many—opportunities are unlimited. For design improvement, increasing strength while reducing weight, enhancing beauty, and lowering production costs—no other material can match OSTUCO Steel Tubing.

While we cannot always promise early delivery estimates on new civilian orders, our experience-wise engineers are at your service to help make your *future plans take shape* with OSTUCO Steel Tubing.

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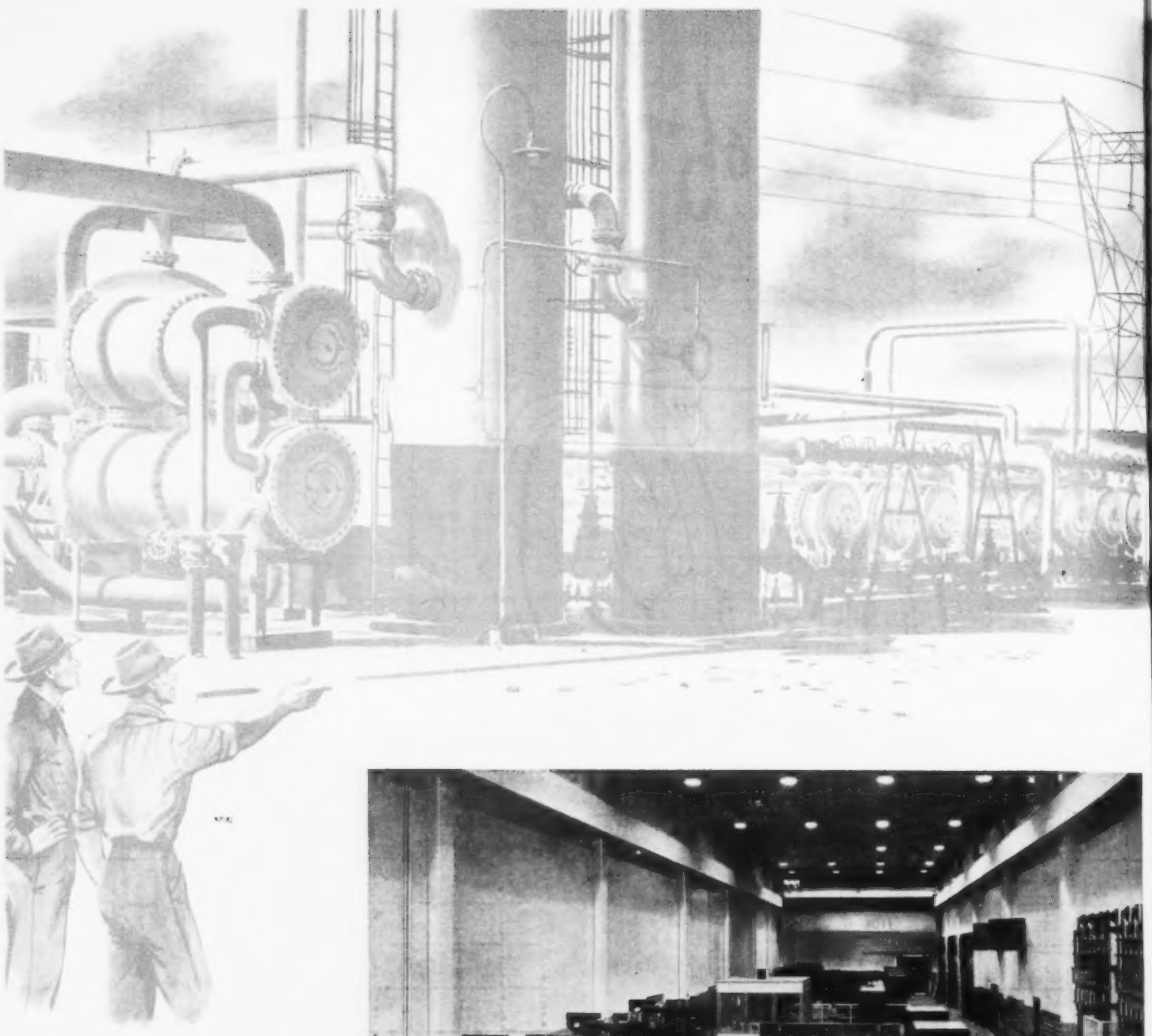


Westinghouse Ignitrons—low-cost d-c power for Western Electrochemical Company's plant at Henderson, Nevada.

CHEMICALS IN THE WEST...MORE PLANTS, WORKERS, OUTPUT

Fast grower and big power user is the Western chemical industry. Since 1939 its productive value has zoomed 274%. The labor force has doubled. More than 300 new plants have been built.

Topnotch electrical equipment helps the industry get the most out of power, helps it grow. Take a prime Westinghouse development like Ignitron rectifiers shown above. Those big cylinders take in a-c power, shoot d-c to electrolytic cells producing sodium chlorate. Power is a big cost item—and Ignitrons deliver d-c more efficiently than *any* other large-scale means. Long range result: lower costs, more sales, *more growth.*

YOU CAN BE SURE.. IF IT'S
Westinghouse

Why Has Western Power Consumption Jumped 3 Times in Ten Years?

Ten short years ago the wattmeters in the West registered 18-billion kilowatthours. In 1950 they chalked up a record-breaking 52-billion kilowatthours—*almost three times the 1940 figure* (and on a per capita basis, 40% more than the U. S. average).

Why the big jump? One reason: the growth of Western industry. Since 1939 the West's industrial output has *more than doubled.* That's where most of the extra kilowatts are going!

Westinghouse fits into this Western power and industry picture in two big ways. First, much of the apparatus that generates the power industry needs, was engineered by Westinghouse. Secondly, Westinghouse equipment, like the Ignitron rectifiers at left, helps industry *use* this power more efficiently.

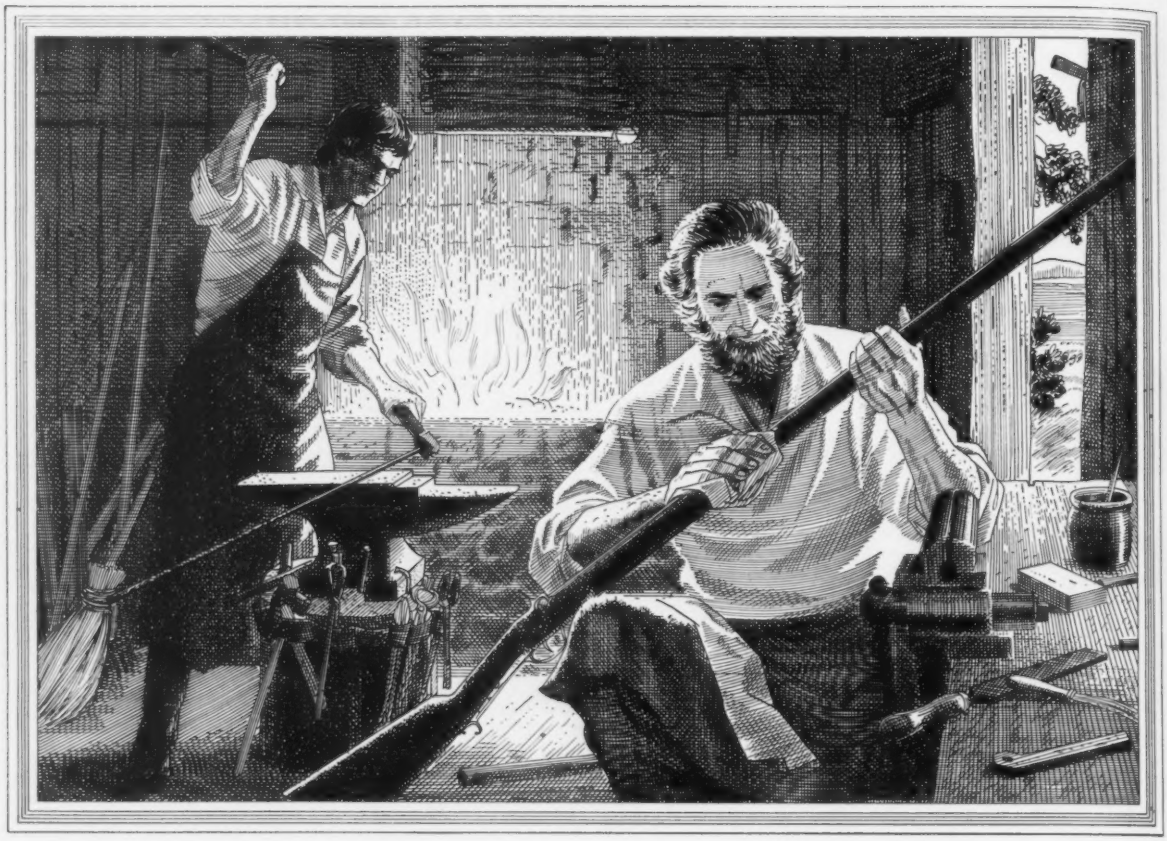
A good deal of the Westinghouse apparatus made for the West is produced at our eight electrical plants IN the West (including Sunnyvale, the West's largest). So Westinghouse itself is part of the growing industry that uses the new Western power.

We have a basic stake, a deep-rooted interest, in the growth of Western industry and power. When you have a problem in electricity—making it, using it, your nearest Westinghouse office is a good place to go. J-92003

Westinghouse

A MAJOR FORCE IN WESTERN GROWTH

PLANTS AT BERKELEY, DENVER, EMERYVILLE, LOS ANGELES, PORTLAND, SALT LAKE CITY, SEATTLE, SUNNYVALE



How today's craftsmanship is fastened to the past

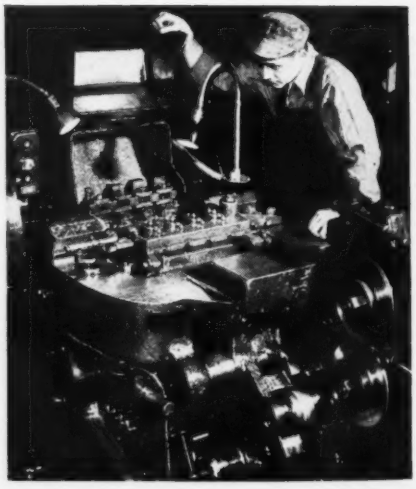
In the early days of the Republic, John Shell began fashioning fine Kentucky rifles . . . lock, stock and barrel.

And though he claimed to be 134 when he died, old John never forgot to give particular craftsmanlike care to the little screws that held lock to stock, for they determined whether or not his rifle would withstand the shock of firing.

Today's makers of guns, tanks, rockets, share John's conviction that the performance of the assembled product depends in no small measure on the performance of its *fasteners.* But in 1951, craftsmanship is available through the aid of *specialists,* like the RB&W worker in the small illustration. He specializes in fasteners alone, devoting a craftsman's skill to producing bolts, nuts, screws and rivets of uniform accuracy, dependability and physical properties.

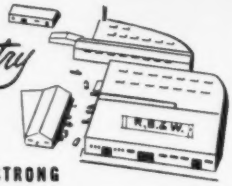
Backing up his experience is RB&W's continuous research, development work, investment in large expansion and improvement programs . . . 106 years of experience in making the finest fasteners.

Now, more than ever, Russell, Burdsall & Ward is proud that its craftsmanship is helping other craftsmen *make strong the things that make America strong.*



RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

RB&W *serves Western industry with the complete quality line*



106 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

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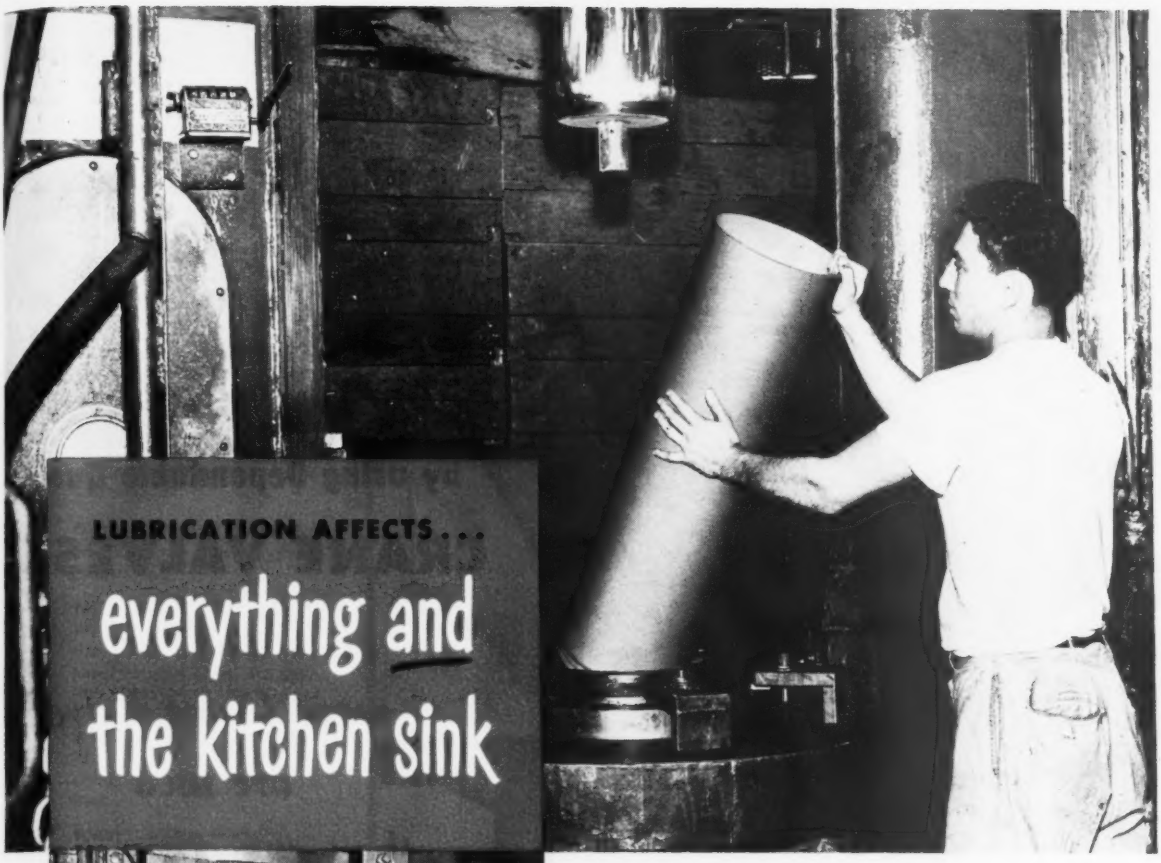

LUBRICATION AFFECTS . . .

everything and the kitchen sink

Steel Cartridge Case comes off 700-ton Lake Erie press at Norris-Thermador.

Kitchen sinks stamped from sheared steel stock by 177-Toledo Knuckle Press.

Auto rim on welding assembly line.

Cartridge cases, automobile wheels, or kitchen sinks – all depend on proper lubrication during manufacture. These are but a few of the many stamped products by Norris-Thermador Corporation, formerly Norris Stamping & Manufacturing Co., the largest metal stamping firm in the West. Now operating on a 24-hour schedule, turning out civilian and military products, Norris-Thermador finds General Petroleum lubrication service and Gargoyle Lubricants more important than ever to efficiency and low production costs.

The preventive maintenance program this service provides results in longer machinery life, simplified lubrication methods, less buying and stocking problems. It will do the same for you – just contact your local G. P. office.

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—converting nature's gift to better living

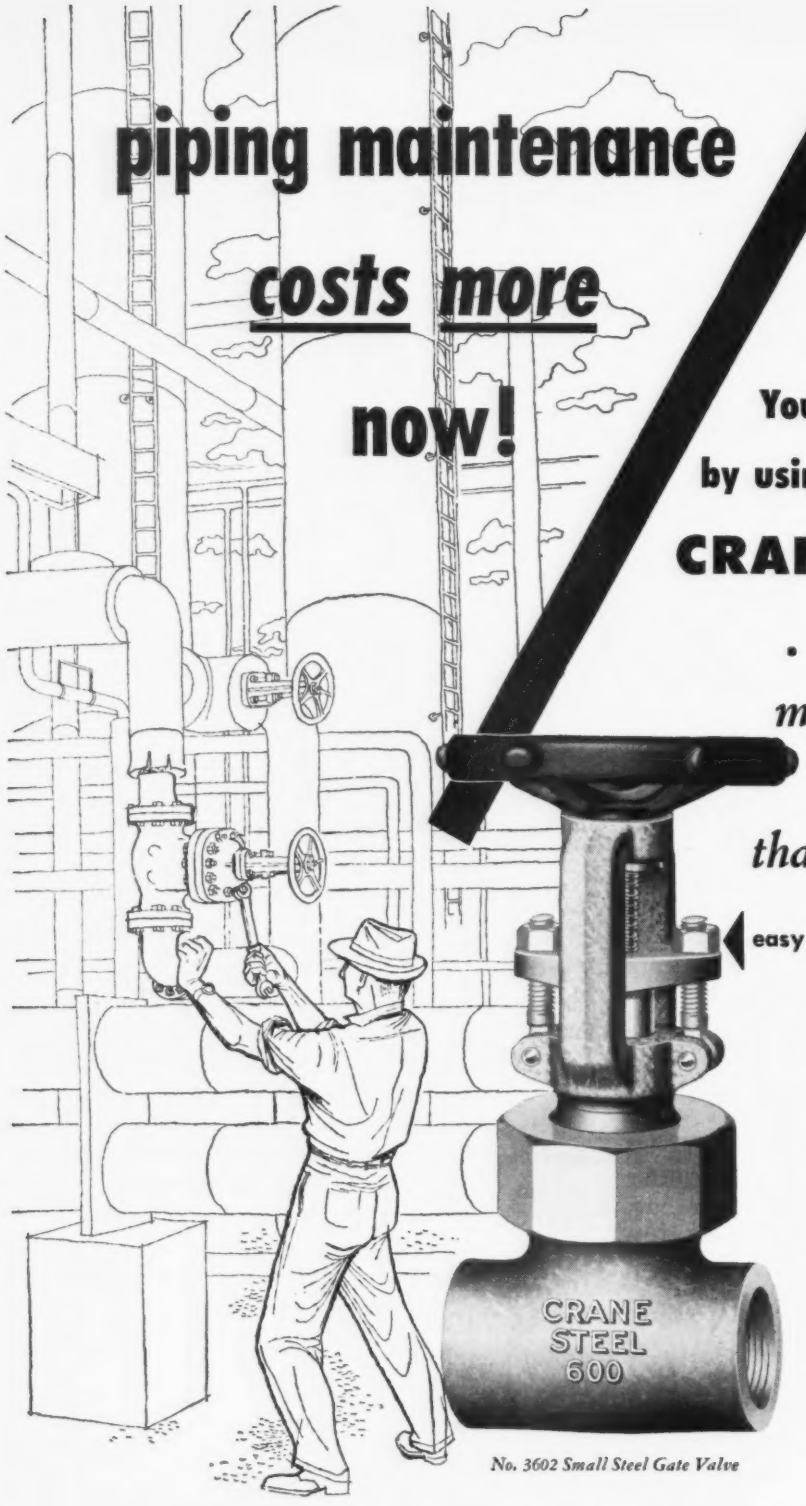
GARGOYLE Lubricants

piping maintenance *costs more* now!

You do less of it
by using Dependable Quality

CRANE VALVES

...That's why more Crane Valves are used than any other make



No. 3602 Small Steel Gate Valve

easy to use...easy to keep on the job

You'll have much less valve maintenance wherever you install Crane 600-Pound Small Steel Gates. Use with recommended trim on oil or oil vapor, steam, water, air, or gas.

Compact yet rugged—light yet strong—these are truly small steel valves with big valve features. They sacrifice nothing that insures dependability and tight seating, easy operation, and convenience in keeping them in top-notch working condition.

Supplied in sizes 2 inches and smaller, No. 3602 valves are engineered to the standards that make Crane Quality your best choice in valves of every type.

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Low first cost— low cost per ton handled

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- ✓ **SIMPLE TO OPERATE.** Anyone can drive a HYSTER *Salsbury* Turret Truck.
- ✓ **USES LESS THAN ONE GALLON OF GASOLINE** per average 8-hour shift.
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HYSTER is one of the oldest names in the materials handling industry. . . . HYSTER trucks are sold and serviced by 52 dealers in the United States and Canada and by dealers in 58 foreign countries. Wherever you are, sales, service and parts are available on the Hyster line of industrial lift trucks, Straddle Trucks, Karry Kranes and HYSTER *Salsbury* Turret Trucks.

PALLET TRUCK. Transports loaded pallets weighing up to 4000 pounds. Several fork lengths. Hydraulic fork lift.
PLATFORM TRUCK. Handles loads of 4000 pounds on skids or tote boxes. Several lengths and widths. Hydraulic platform lift.
TUG. Tows trailer trains up to 20,000 pounds. Most maneuverable towing unit on the market.
CARGO TRUCK. Capacity 4000 pounds. Low platform makes bulky or heavy cargo handling easy.
HYSTER

Operator Either Rides or Walks . . .

HYSTER *Salsbury* Turret Trucks compare in cost to most "walker-controlled" trucks—with all the features of rider-operation.

These horizontal transporters handle any type of load up to 4000 pounds. They go anyplace where man-pulled or power-driven trucks of the "walker-controlled" type can go—and the operator EITHER RIDES OR WALKS.

HYSTER *Salsbury* Turret Trucks are basic machines for new materials handling plans — will fit into any existing system. In wholesale drug and grocery companies, automobile or aircraft plants, warehousing, docks, shipping terminals, refineries, produce markets . . . anyplace where there is a need for fast, low-cost handling, Turret Trucks are in use. Tight quarters, narrow aisles and ramps are no problem for the Turret Trucks.

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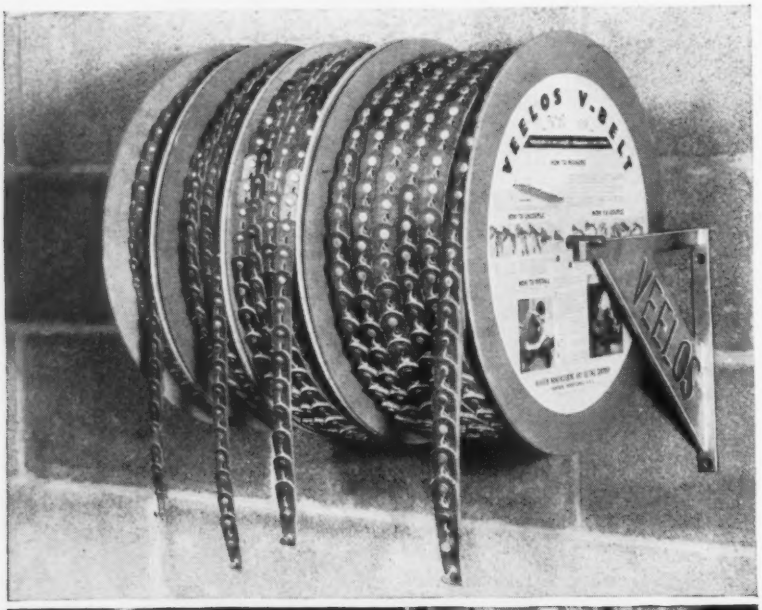
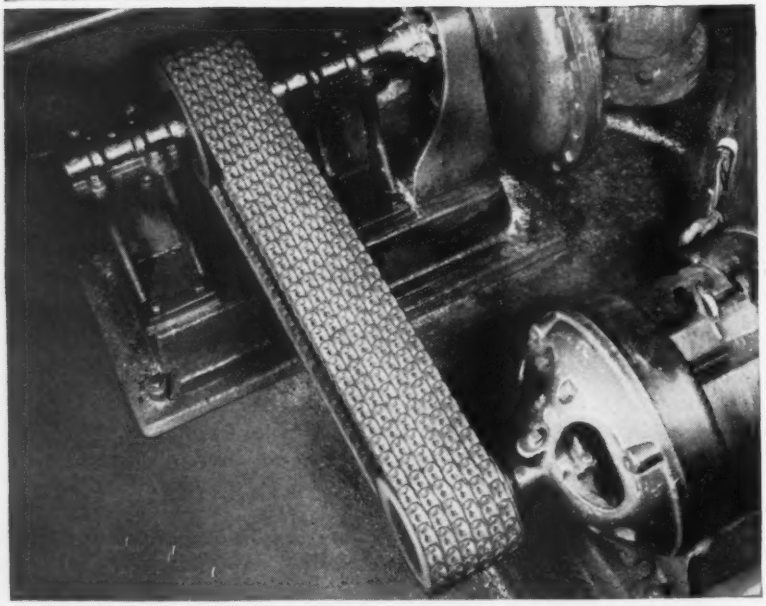
Veelos—*the Adjustable V-Belt*
Pays for Itself





In Inventory . . .

Veelos pays for itself by reducing required v-belt stocks. Just 4 reels of Veelos cover *every* v-belt need (up to 316 sizes) in the O, A, B and C widths. Stock only one reel for each width of belt you use—and *any length is readily available.*

In Maintenance . . .

Veelos pays for itself because it can be installed quickly and easily without dismantling outboard bearings or moving motor. Individual belts can be adjusted by simply removing or adding links.

In Operating Efficiency . . .

Veelos pays for itself because uniform tension can be maintained on all belts to provide vibrationless, full power delivery. Simple adjustment of each belt means that *matched sets stay matched.*

Write for your copy of the Veelos Data Book. It gives the complete story on why *Veelos pays for itself.*

MANHEIM MANUFACTURING & BELTING COMPANY
Manheim, Pennsylvania

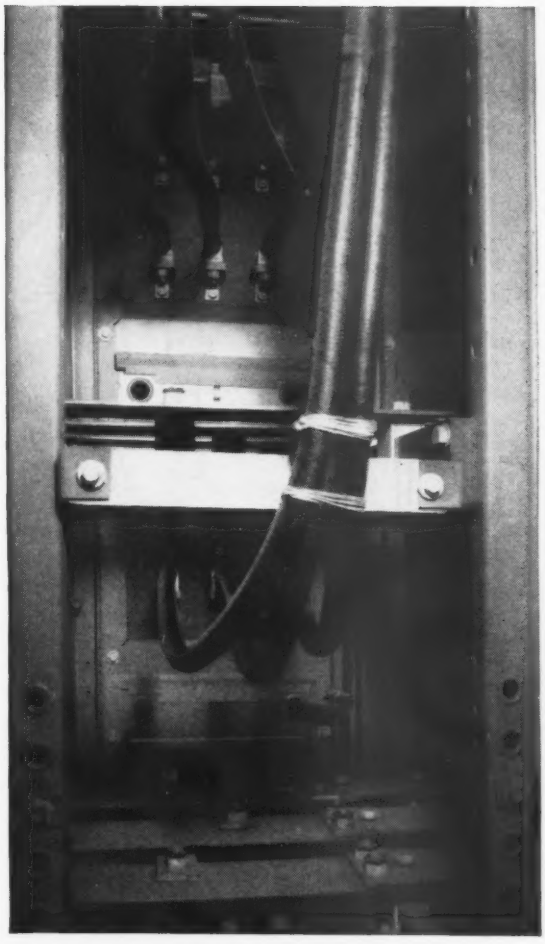
ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all widths in three types; regular, oil-proof and static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. Veelos is known as VEELINK outside the United States.

VEELOS
THE LINK
V-BELT

A user REPORTS...

After their satisfactory experience with the 500,000 C. M. insulated aluminum cable (at right), National Supply Co., Torrance, Cal., says, "We will seriously consider aluminum when similar installations are planned." These cables, insulated with RH 600 v. U. S. Paracore, are connected to bus, from which they carry current to distribution panels for such heavy loads as welding machines, shears, rolls and other equipment.



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When you plan new production lines, add feeders for heavier loads, get prices both ways—in aluminum and in copper. You'll find you can make worth-while savings with aluminum . . . and installation is faster, easier because of aluminum's light weight.

Although the rearmament program restricts the use of aluminum, we are ready to help you with the planning for trouble-free, low-cost wiring.

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That's because YALE makes all kinds of hoists...electric hoists, hand hoists, wire rope and chain hoists, trolley and hook suspension hoists, hoists with capacities from 500 pounds to 40 tons...each one *exactly* suited to a specific job!

This aluminum YALE Load King with synchromatic load brake, for example, is ideal where portability and fast, easy, hand lifting are desired.

Your YALE distributor can help you select the hoist that will wear longer, work harder and save more money on the particular kind of lifting done in your plant. Call on him soon.

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Editor, *Western Industry:*

Would you be so kind as to furnish us a copy of *Western Industry's* article published during 1950 wherein an independent oil company exposed their simple, monthly method of advising each employee of his coverage and benefits? (Salary, insurance, pension, etc.)

T. G. LaFollette
General Electric Company
Hanford Works
Richland, Washington

* * *

Helpful Information

Editor, *Western Industry:*

An article appearing in the April issue of *Western Industry* has attracted our attention, and we would like very much to have at least three additional copies as soon as they are available. The article referred to starts on page 50 ("Pays to Organize, Anywhere") and contains some very interesting and helpful information.

We would greatly appreciate the receipt of three additional copies when it is convenient to supply them to us.

Douglas A. Wheelock
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San Francisco, California.

* * *

A Reference Tool

Editor, *Western Industry:*

We are expanding our library facilities at the College of Engineering of West Coast University, and inasmuch as our students are very much interested in the current publication of *Western Industry,* we would appreciate being placed upon your mailing list, or receiving information from you regarding subscription rates for educational organizations.

Dorothy Donovan, Registrar
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* * *

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Editor, *Western Industry:*

Please enter our subscription to *Western Industry.*

We are going to include your publication in the Labor-Personnel Index which goes to personnel managers, libraries, universities and unions all over the country.

Florence Kretzschmar,
Director, Information
Research Service, Inc.
Detroit, Michigan.

* * *

Thorough Reporting Job

Editor, *Western Industry:*

I want to tell you how much we enjoyed the article about Arrowhead Rubber Company in the April issue of *Western Industry.* It is one of the most thorough reportorial pieces of writing I have noticed in a long

Continued on page 26

EDITORIAL COMMENT

A New Honor Scroll?

FROM TIME to time wisecracks are passed out about how the older generation should be given rifles and sent to the front, leaving the youngsters at home. Then, of course, the oldsters would have to prove whether they were as brave as those whom they replaced, and also there would be fewer wars. At least so the wisecrackers would have you believe.

Actually, we feel that the "over 35's" would turn out to be just as gallant (many of them proved it in 1917-1918), and there might be just as many wars as ever. *Quien sabe?* But if a man of any age should be brave under fire, willing to risk life and limb for his comrades and his country, should it not be an equal test of patriotism and courage to risk dollars on the home front?

When shortages of materials impend, why should he not be ready to say "Maybe we will run short, maybe the price will go sky-high, but I will take the chance. Not an order will I place for anything beyond normal needs. Not an inch will I step up my ordinary purchases."

Would runaway prices ensue, would gray markets and black markets spring up and flourish if industry executives would take this stand? Does it require any more courage than flying in a bomber or fighter plane, manning a tank or crawling over open ground with a rifle? Is this kind of bravery any less essential than the kind displayed in Korea?

Who will volunteer for the "suicide squad" on the home front, just as he would glorify the son, nephew, younger brother or neighbor's boy who volunteers to take the supreme risk across the Pacific? Show us a scroll of honor on which a man may write "I did not build up an inventory. My country's need was greater than my own." Who will be the first to put a scroll of that kind in his own reception room?

Save Waste Paper and Boxes

"WILL YOU please urge your readers to save, not burn or destroy, old corrugated boxes and kraft paper and bags, and get them back to the mills via a waste paper dealer?" we are asked by the Midwest Consumers of Waste Paper. This organization says reports from many sections of the country are that industrial plants and retailers, while pressing for increased packaging supplies on one hand, are destroying the raw material from which this packaging is made. It is stated that at the present time only about 20 per cent of the corrugated now manufactured finds its way back as waste paper, compared to much higher percentages for old newspapers and magazines.

Power of The West

ANOTHER example of the importance of the West in the nation's economy:

The January-February rise in commercial and industrial employment on the Pacific Coast accounted for half the increase for the nation, reports the Bureau of Labor Statistics. This rise of 20,000 on the Coast was the first for that period of the year since 1943 and brought Coast employment to a level more than 400,000 above a year ago.

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. . . when the 2 are

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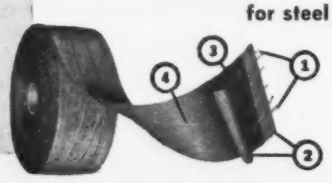

Angier

Industrial Protective Papers—Since 1895

IN OUR MAILBOX

. . . Continued from page 25

time. You are certainly to be congratulated on the consistently interesting content of *Western Industry*. That of course is the thing that will assure your increasing success in the industrial magazine field.

L. A. JOHNSON, President,
National Motor Bearing Co., Inc.
Redwood City, Calif.

* * *

Solving a Problem

Editor, *Western Industry:*

In the April issue of *Western Industry* you have an article on page 54 showing various solutions to the problem of "Tunneling out" in connection with the bin storage of sawdust and other wood fuels.

We are about to construct a new sawdust bin and have decided, in the interests of economy and space, to make this bin a silo-type affair of reinforced concrete, approximately 20 feet in diameter with a cone bottom.

We were particularly interested in your Solution No. 2, submitted by Mr. W. E. Saxe, president of the Conveyor Co., Los Angeles, Calif., but the information contained in your article was rather meager. Would it be possible to obtain further detailed information concerning this particular solution?

Yours very truly,
J. R. GLENDENNING, Supt.,
Borden's, Albany, Oregon.

* * *

Water Treatment

Editor, *Western Industry:*

Mr. Hawksley's article in your April issue on the treatment of water follows very closely our experience in this matter. We are of course using evaporators on our high pressure make-up and hot lime soda in our low pressure, with close control of chemical treatment.

R. SMITH, Works Manager,
Colorado Fuel & Iron Corp.,
Pueblo, Colorado.

* * *

A Popular Issue

Editor, *Western Industry:*

I am most anxious to acquire a copy of your January 1951 issue of *Western Industry*. It seems that none of the news agencies here can supply me, so I'm taking this opportunity to write and ask you direct. If you can mail me one, I would certainly appreciate it.

JOHN MARKWART
Del Paso Heights, California.

* * *

Corrosion Cornered

Editor, *Western Industry:*

Most of our problems are chemical and we are conscious of the possibility of electrolytic corrosion and in some cases use the dissimilar metal chart (illustrated on p. 51, March 1951 issue, in article "Corrosion! Corner It!) for guidance in the protection of some equipment, such as pipe lines, etc. This article is quite interesting and if it is not too much bother, would appreciate a couple of copies to be posted in our shops.

R. J. KENNARD, Chief Engineer,
Mechanical & Electrical Dept.,
Anaconda Copper Mining Co.,
Butte, Montana.

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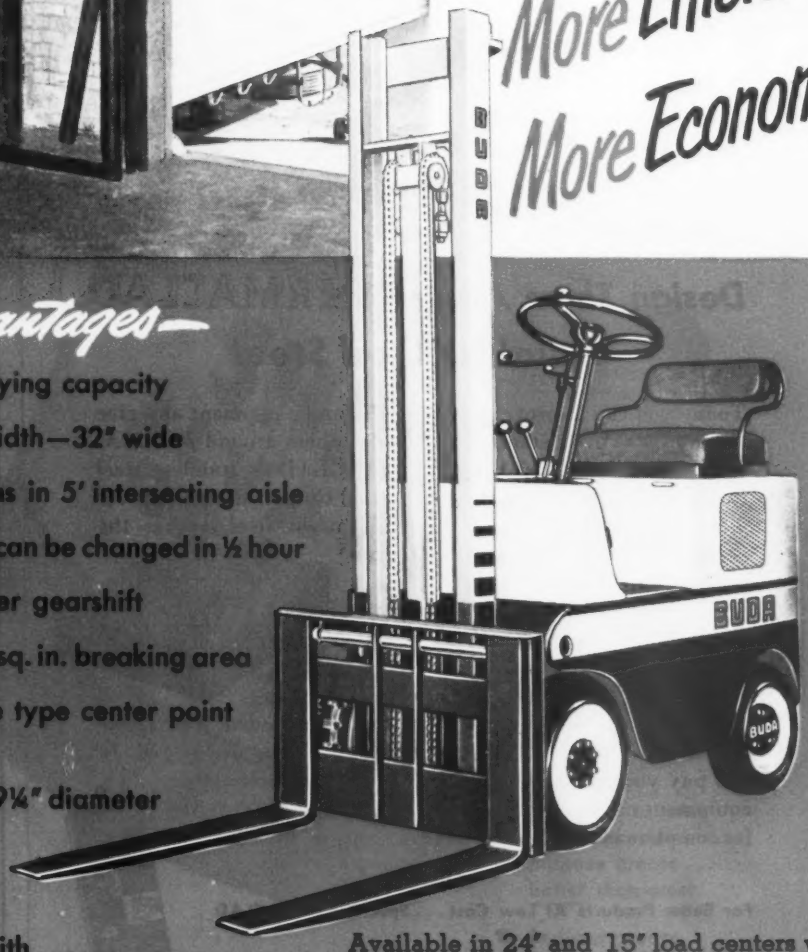

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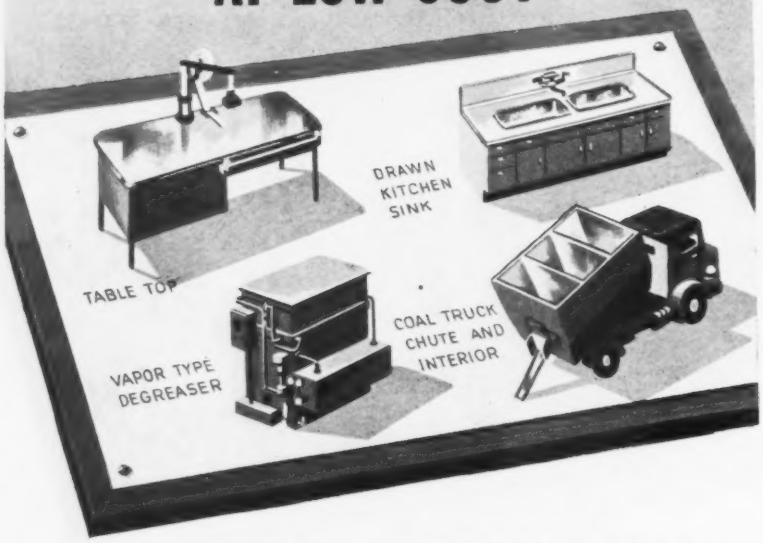

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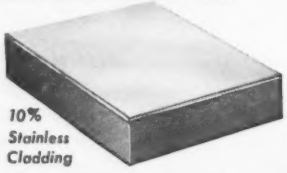

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CALENDAR OF MEETINGS

June 12-15—Subcontractor Assistance Clinic, Oakland Exposition Building, Oakland, auspices Armed Forces Regional Council. Contact Commander D. V. Wengrovius, chairman industry relations committee. EX 2-6820, Ext. 254.

June 15-30—First Seattle International Japanese Trade Fair, Seattle, Wash. Contact Robert Story, Mgr., World Trade Division, Seattle Chamber of Commerce, Seattle.

June 17-29—Summer Management and Personnel Conferences, California Institute of Technology, Pasadena, Calif. Contact Robert D. Gray.

June 18, 19, 20—SPI Pacific Coast Chapter Conference, The Society of the Plastics Industry, at Tahoe Tavern, Lake Tahoe, Calif. (Note date change from June 14, 15, 16.) Contact Langdon P. Williams, SPI, Inc., 295 Madison Ave., New York 17, N. Y.

June 19—Institute at Oregon State College, special public session on Northwest Resources Mobilized for National Defense and Security, Oregon State College, Corvallis, Oregon. Contact Dr. J. Granville Jensen, O. S. C., Corvallis.

June 20-22—Heat Transfer and Fluid Mechanics Institute, at Stanford University, Palo Alto, Calif. Contact Director of Information, Stanford.

June 21-24—Third Annual Summer Management Conference sponsored by Institute of Industrial Relations and School of Business Administration, University of California, at Casa del Rey hotel, Santa Cruz. Contact Clark Kerr, Director of Institute of Industrial Relations, UC, Berkeley. Theme of conference is "Business Problems in a Crisis-to-Crisis Economy."

June 24-28—Pacific Coast Paper Box Manufacturers Assn., 1951 Convention, at Empress Hotel, Victoria, B. C. Contact J. N. Mills, Exec. Sec., 672 So. Lafayette Park Place, Los Angeles (DU 3-0221).

June 24-29—American Pulp & Paper Mill Superintendents Assn. national meeting at Multnomah Hotel, Portland. Contact R. B. Morden, Morden Machines Co., Pacific Bldg., Portland. BE 9354.

June 25-30—Subcontractor Assistance Clinic, Seattle, 860 Terry, N. Contact Col. W. A. Davis, Air Force Plant Representative, Boeing Airplane Company, RA 0800, Ext. 1211; alternate, Commdr. A. R. Johnson, Supervising Inspector Naval Material, SE 3100.

July 1-4—American Society of Heating and Ventilating Engineers national meeting, at Multnomah Hotel, Portland. Contact Bert Farnes, Farnes & Martig, 417 N.E. Couch St., Portland. EA 1949.

July 8-13—Natl. Flat Glass Jobbers Assn., Mirror Mfgrs. Assn., at San Francisco. Contact Miss Minita Westcott, Ex. Sec., 2217 Tribune Tower, Chicago 11, Illinois.

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An urgent memo to subcontractors:

WHY INSPECTION MUST BE TOUGH

By H. O. WILLIAMS
Chief Inspector
Douglas Aircraft Company
Santa Monica, California

MANY TIMES a subcontractor takes exception to having the representatives of a prime contractor's inspection division entering his plant for the purpose of making a survey. I should like to point out why we must do this.

In the first place, material provided by a subcontractor has to fit with parts supplied by other subcontractors as well as those made by the prime contractor. They must all be made by the same standard.

In the second place, the prime contractor is responsible to his customer, for all work delivered to that customer —including items supplied by all subcontractors. Since our primary customer is the government, and since the government includes notice to that effect in our contract, we must make such surveys in plants of our subcontractors.

Specifications Pin Responsibility

In the general specification for quality control (appearing in our contract with the government) we read:

INDUSTRY COMPLAINS:

Executives and quality control directors made these major criticisms of armed services inspection during World War II:

- Too much duplication among the services.
- Too much duplication of the contractors' efforts.
- Military inspectors, especially civil service personnel, were poorly trained and unqualified for their job.
- Many of the design specifications were too rigid or too ambiguous.
- Many of the design requirements were impractical, too complicated, and did not follow standard commercial practices.
- Too much 100% inspection—too little spot checking and use of statistical quality-control methods.
- Not enough cooperation and awareness that the contractor could do the job, if given the chance.
- Too much Red Tape.

ARMED SERVICES REPLY:

Armed Services inspection personnel made these criticisms of industry:

- Lack of knowledge of the contract and its requirements.
- Deliberate efforts on the part of some contractors to evade the contract requirements or make good a low bid by "cutting corners."
- Lack of any inspection system that could be called one.
- An attitude, on the part of some, of "soak the government wherever possible."
- Limited use by manufacturers, particularly small and medium-sized companies, of modern management techniques and statistical quality control.
- An unsympathetic attitude toward use or introduction of quality-control techniques.
- Lack or inadequacy of quality history records.
- An uncooperative attitude.

(Source: National Industrial Conference Board Studies in Business Policy, No. 50)

HOW TO AVOID THESE TROUBLES IN THE FUTURE? SEE NEXT PAGE →

"Prime contractor shall insure that the provisions of this specification are made binding on all subcontractors and suppliers. Articles not manufactured or processed within the prime contractor's facility that are of such a nature that an adequate inspection cannot be satisfactorily and economically conducted upon receipt at the receiving contractor's facility shall be subject to government source inspection.

"When conducted, such inspection by the government shall not be considered as a guarantee of final acceptance, nor shall it relieve the prime contractor of the responsibility to furnish an acceptable end article."

It also states the prime contractor shall be responsible for initiating corrective action with his subcontractors and suppliers on discrepancies found upon receipt of supplies, whether or not such supplies have received government source inspection.

Beyond that, it is just good business on both the part of the subcontractor and the prime contractor to cooperate,

H. O. WILLIAMS, author of this timely article on war-time inspection troubles, is chief inspector for Douglas Aircraft Co., Santa Monica, Calif.

and continually turn out an acceptable product of the specified quality.

The inspection division of the prime contractor is vested with authority to make all contacts between manufacturing and the government representative. To carry out the duties of that office properly, the inspection division must know thoroughly the contract and all the specification requirements.

100 Directives to Satisfy

By specification requirements, I mean not only your own engineering specifications, but the applicable government specifications, directives, and technical orders. Of these there are well over 100 that directly affect inspection, consisting of A.M.C. Regulations, A.M.C. letters, A.F. Regulations, Headquarters Office Instructions, D.O.I.'s, P.D.O.I.'s, L.A.P.F. O.'s O.I.'s, and the new MIL STD Specifications which are joint Army and Navy specifications, all of which are very detailed in their requirements.

Here are a few examples of the requirements of some of these specifications:

"The contractor shall develop and maintain an effective and *economical* Quality Control system in accordance with this specification. The system

INDUSTRY RECOMMENDS THAT THE MILITARY—

- Secure better-qualified personnel for inspection.
- Improve training programs for inspectors.
- Use more military personnel in inspection activities rather than civil service employees.
- Increase compensation of inspectors.
- Develop more definite job specifications.
- Unify inspection activities for all three services in one central agency.
- Reduce inter-service inspection duplication.
- Do not attempt to duplicate contractor's inspection—instead, check on its effectiveness.
- Make wider use of sampling and spot checking and surveillance inspection.
- Make wider use of "certificates of compliance."
- Use statistical quality-control techniques wherever applicable.
- Make specifications simpler and more explicit.
- Simplify inspection procedures and make them uniform for the three military departments.
- Accept the contractor's certification of quality on standard commercial articles.
- Employ source inspection on subcontracts.
- Reduce paperwork and "red tape."
- Inform the contractor at the outset of inspection requirements.
- Appreciate that industry can do the job, is honest and reputable (punish the few exceptions, not everyone) and is willing to cooperate.

THE MILITARY RECOMMENDS THAT INDUSTRY—

- Know the contract thoroughly, its supporting documents, and all requirements in detail.
- Become thoroughly familiar with government contract procedures, if not already acquainted with them.
- Know what the inspection requirements are for the contract.
- Develop a better inspection system. (This recommendation is particularly directed toward the small and medium-sized manufacturer.)
- Develop written inspection procedures and manuals.
- Make wider use of statistical quality-control techniques.
- Execute paperwork required on contract promptly and accurately.
- Be sure that acceptance and shipping documents are accurately filled out in every detail. Battles are won, not lost, if right material is at the right place at the right time.
- Maintain accurate and complete records of inspection activities.
- Recognize that paperwork and "red tape" are sometimes necessary to assure that supplies are what they should be and are available when needed.
- Recognize that the individual services often have different uses for the same thing and so require different handling and processing of this article—such duplication is often necessary.
- Cooperate.

(Source: National Industrial Conference Board Studies in Business Policy, No. 50)

shall assure that adequate inspection coverage is maintained throughout the process of manufacture, including packaging and shipping, etc., etc."

Economy? Alas!

And so you are all keyed up, believing that at last somebody is thinking in terms of economy, but alas! The next paragraph reads as follows:

"The contractor shall prepare a written description of his quality control system which will include an organization chart, and a plant layout, with the location of inspection stations indicated. The organization chart shall clearly indicate the functional relationship of quality control to top management, production, engineering, and to other departments of the contractor's organization.

"The quality control supervisory force by name and assignment may be included in the organization chart or on a separate list. The written general description shall include the inspection procedure, covering all phases of the inspection, operation, check lists, operation cards, standard forms, and other material used in the contractor's quality control system shall be included as part of the general description.

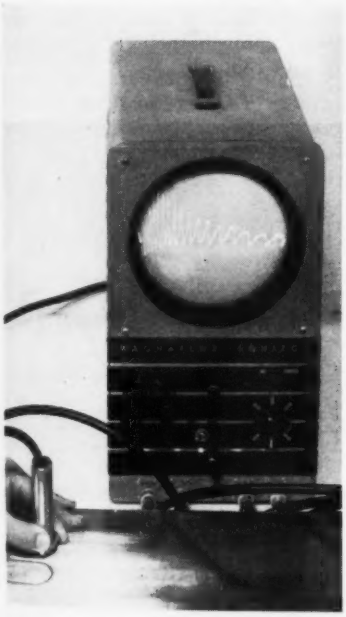
"Prior to the time the contractor begins production on the contract, his written procedure will require the approval of the inspector. All changes in the contractor's written procedure will be subject to review and all changes in procedure shall be incorporated in the contractor's quality control manual in accordance with a definite schedule.

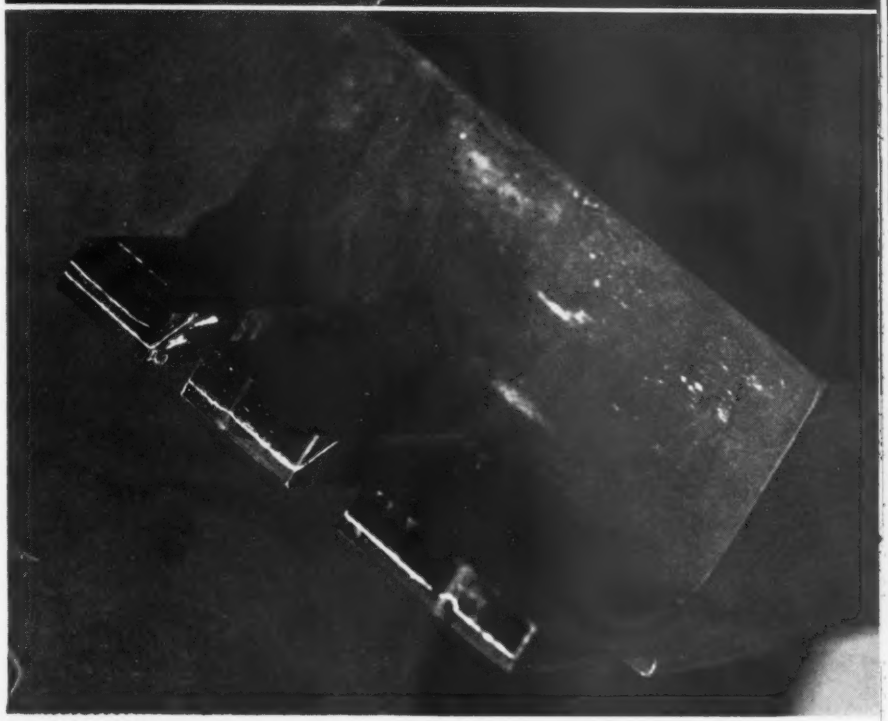
"The contractor shall maintain adequate records of inspections and tests performed. Such records shall be available for review by the government representative. These records shall conform to the following requirements:

(1) All quality characteristics shall be listed.

(2) Those characteristics which do not conform to specifications,

Example of sub-surface scanning for lamination. Material being tested is 24ST plate, measuring 1½ x 12 x 30 in. Equipment being used is the "Sonizon."





TOP—Typical examples of defects found by the receiving inspector: a cracked ceramic insulator and three castings. Casting on the right is a magnesium alloy seat. Every casting in the lot was found cracked. The defects extended completely through the part but were not visible to the naked eye.

BOTTOM—Example of a defect found by the "Zyglo" method on a spar cap. This defect shows up as a material lamination. The notches were cut into the piece after rejection to show the depth of the defect. Douglas also uses X-Ray, Fluoroscope and Ultrasonic methods to inspect incoming raw materials.

Processing non-ferrous castings, inspector in receiving department uses the Zyglo or Fluorescent Penetrant method. Operation is a progressive one, the work flowing from left to right, from the oil dip to soaking rack to the wash station, then the developer, and through the dryer into the inspection booth. In one year's time, the Douglas receiving department processed 125,000 non-ferrous castings and forgings, of which 8% were found defective, rejected, and returned to vendors for credit. A subsequent tightening up and a few changes in casting techniques by vendors, as a direct result of this type of receiving inspection, reduced the rejections to present rate of about 2%.

or drawing requirements shall be indicated.

(3) When sampling inspection is used, the classification of defects, lot sizes, sample size, acceptance and rejection numbers, and number of defects or defectives found shall be stated.

(4) Results of interchangeability inspections and functional tests, including method of testing, shall be indicated.

"The records shall reflect recurring discrepancies and shall contain complete information regarding corrective actions taken by the contractor. The contractor's inspectors shall be furnished with individual instructions to assure complete inspection coverage." And, don't forget, all this is to be done while still thinking in terms of economy.

Inspection vs. Speed and Quality

If inspection is carried to extremes, it can defeat its own purpose; first by denying the customer or the soldier in the field any equipment, good, bad, or indifferent; and second, by slowing down production to such a point that equipment reaching them is too little or too late. Inspection difficulties in World War II between industry and the military did slow down production at times. In a few instances production was stopped.

Generally, however, production was kept rolling and quality goods were delivered on time and in sufficient quantities. Difficulties, when they did occur, caused waste of effort, manpower and materials. Time and money were wasted in disagreements over too rigid requirements, impractical and not too clear interpretation of specifications, and having to put up with inefficient, untrained, or unqualified inspection personnel on both sides.

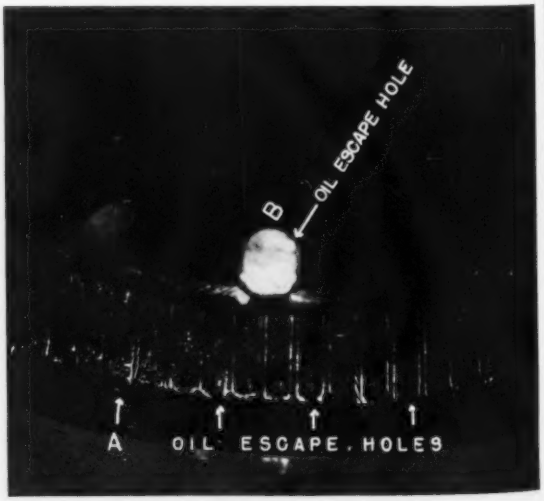
Management also expects your inspection division to create the incentive to the production man to produce a quality article. This has to be a cooperative effort on the part of production and inspection, as inspection cannot write quality into your product. It has to be built in.

A New Field for Inspection

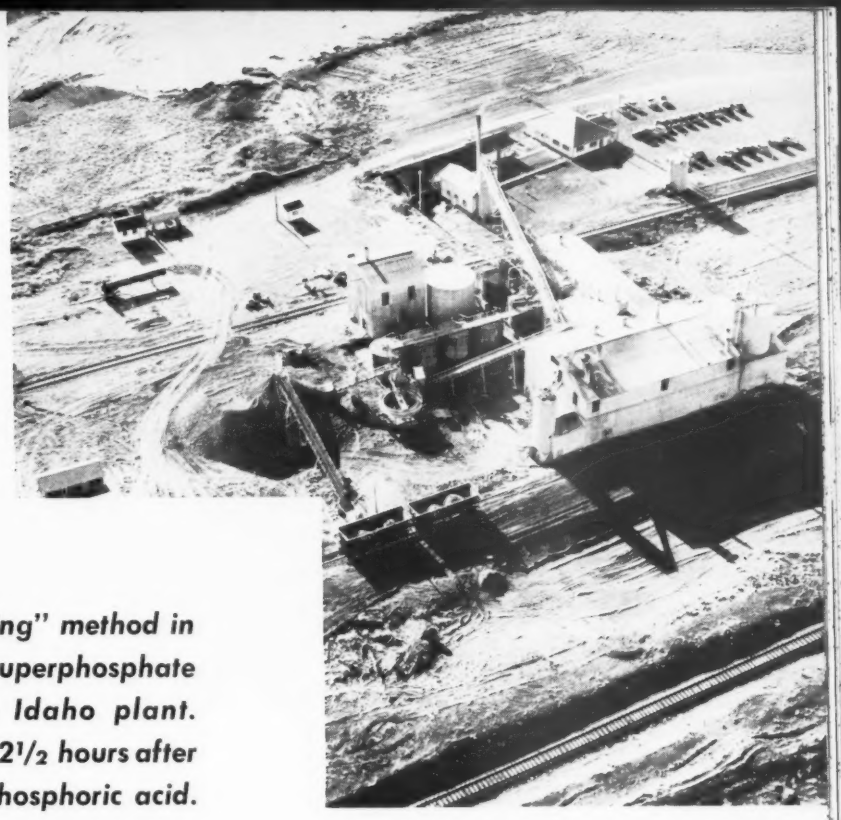
During the last few years an entirely new field has been opened up to industry. I am referring to the field of Non-destructive Testing and Inspection. This field has opened up the development of new types of equipment, new processes, and new procedures.

We, at the Douglas Aircraft Company, are very happy and proud to have played a small part in the establishment of some of these methods into our operations, as we feel that by so doing, we have not only materially reduced our costs, but we have definitely raised the quality of our product.

No longer do we have to guess as to the internal structure of the materials we use, only to find out after we have spent all kinds of money machining and fabricating the material into parts, that we have to reject the parts as not usable. Through the use of Non-destructive methods and procedures, we now know we have sound materials going into the shops. Spectacular savings in inspection costs and the shipping of far fewer defective units are being realized by many manufacturers today through the use of statistical quality control.



A nitralloy gear failure. Fine line indication as shown by Magnaglo reveals cracks through the nitride boundary. Vendor doing this heat treat work corrected discrepancy by providing boundary of greater depth.



Gates Bros. phosphoric acid and triple superphosphate plant at Wendell, Idaho. Triple department is in largest building, acid plant is in wing, and concentrator is in high square building at left.

Long and expensive "curing" method in manufacture of triple superphosphate fertilizer eliminated at Idaho plant. Granular product bagged 2½ hours after treating raw rock with phosphoric acid.

CONTINUOUS PROCESS SPEEDS CHEMICAL OPERATION

SUBMERGED COMBUSTION concentration in the manufacture of phosphate fertilizer is not new, but the modifications of the technique used at the Gates Bros., Inc., plant at Wendell, Idaho, has engineers all over the country watching this new equipment. This is also the first case where Western phosphate rock has been treated without calcining.

The plant was designed to produce triple superphosphate by a continuous process, eliminating the long and expensive "curing" period. Thus it became the first plant built by private industry to produce high analysis soluble phosphate by the continuous method.

Raw Rock to Product, 2½ Hours

Pilot plant operations quickly proved that Western phosphate rock had unusual characteristics that complicated the continuous triple process, and for a while these problems threatened the entire project. Eventually the small but alert technical staff mastered the difficulties and it become possible to bag granular triple superphosphate approximately 2½ hours after the raw rock was treated with phosphoric acid.

Processing Problems

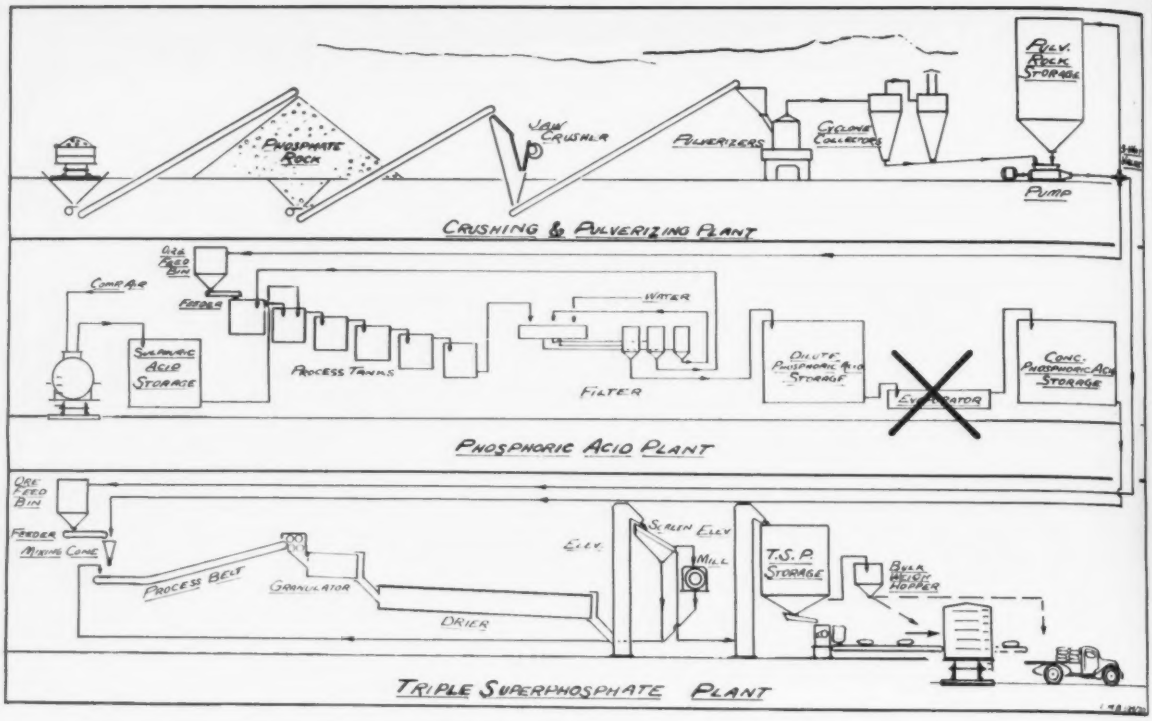
To produce triple it is necessary to have 52% P_2O_5 phosphoric acid. This required a phosphoric acid plant which Gates engineers designed with an eye on reduced manpower requirements and the use of the most modern equipment available. Here again Western rock presented processing problems not found in Southeastern rock. Extensive studies were made on four different types of Western rock. The rock selected is digested without preliminary treatment (i.e., washing, flotation, or calcination).

Quick digestion under carefully controlled conditions is used, eliminating the conventional bulky system which requires extensive washing of muds (gypsum) to recover phosphoric acid. Western phosphate rock contains a higher fluorine percentage which presents a greater variety of corrosion and materials problems that are being solved by the Gates technical staff.

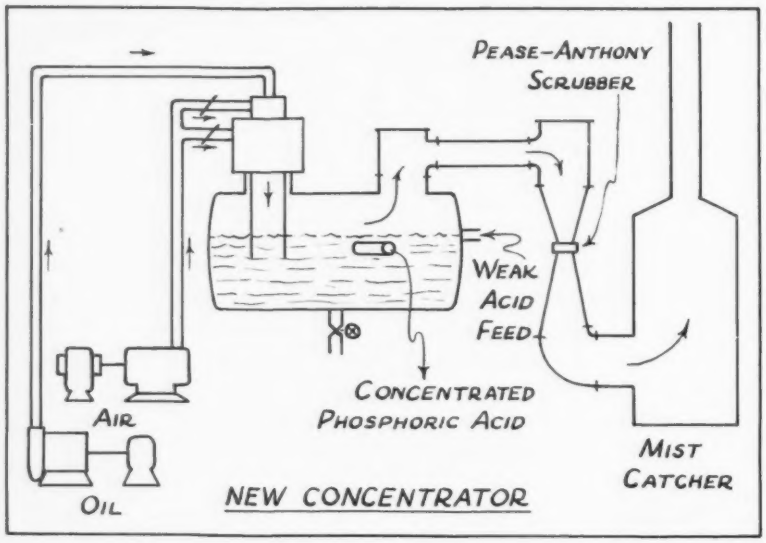
Grinding, Digesting and Filtering

Some interesting information has been released regarding the plant. Two Williams pulverizers grind 13.5 tons per hour of primary crushed phosphate rock to 90% through 100 mesh. Drying and grinding is accomplished in the same operation. Rock is brought to the plant by rail from western Wyoming. The rock requirement for the acid and triple plant is approximately 100 tons per day.

Pulverized phosphate rock, containing 32.5% P_2O_5, is digested with concentrated sulfuric acid. Digestion time is approximately two hours and operates continuously, rock and acid being accurately fed into the system through a series of meters and weighing de-



FLOW SHEET of Gates Bros plant shows details of the continuous process from the time rock is ground until finished product is packed in bags. Unique features of the plant include: (1) Use of continuous horizontal filter to replace thickener tanks (crossed out) for settling gypsum from phosphoric acid, and (2) first submerged combustion concentrator put into operation (drawing below).



vices. At the end of the digestion, 99.4% of the P_2O_5 in the rock has been converted to phosphoric acid.

Mud (gypsum) is removed from the weak, 30% P_2O_5, phosphoric acid on an 11½-ft. Oliver horizontal filter. The first use of this equipment in the West produces a by-product gypsum from which approximately 98.5% of the soluble P_2O_5 has been removed. Gypsum contains about 25% moisture when discarded (and subsequently sold for soil application). 30% P_2O_5 phosphoric acid must be concentrated to over 50% P_2O_5 before it can be used in triple manufacture.

First Submerged Concentrator

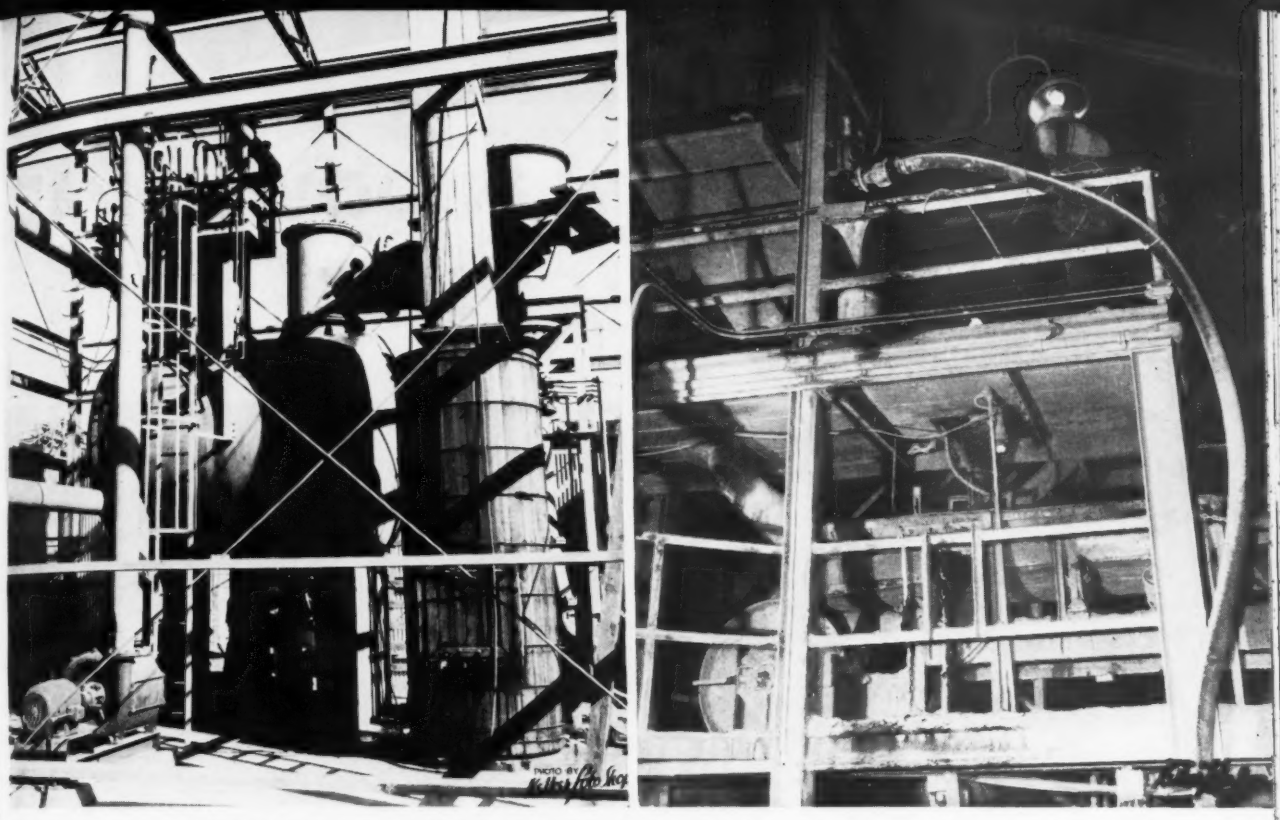
For the submerged combustion concentration operation Chemical Construction Corporation of New York developed a new design. The equipment was built in the machine shop and assembly plant for farm equipment operated by the Gates Brothers in Wendell, and was erected by the Gates staff.

Liberal use was made of Hastelloy, stainless steel, Haveg, special acid-proof brick and cements to build this $65,000 unit. A fuel oil burner on top of the concentrating chamber fires a combustion chamber to 2400 deg. F., after which the combustion products pass through a special alloy "dip pipe" with its open end submerged below the level of the acid in the concentrating chamber. Hot combustion gas percolates through the acid heating it to about 240 deg. F., and carrying off water vapors in the form of steam.

Controlled Efficiency

A Pease-Anthony scrubber washes the exit gases and removes 98% of the entrained impurities before the steam enters a mist collection tower. The concentration process operates continuously, producing 60 tons of 50% P_2O_5 phosphoric acid each 24 hours. Operation of the unit is practically automatic, requiring only periodic checking by the acid plant supervisor.

Fuel efficiencies in excess of 90% have been obtained on sustained operation. Scaling problems and heater tube failure have been removed by this procedure. A wide variety of alloys and acid-proof brick have been used to



Phosphoric acid concentrator, left. Horizontal unit is concentration chamber with burner box and control at top left, gas exit through tee at top right. Gas scrubber is behind wood mist catcher. View at right is in triple plant. Phosphoric acid and rock feeding is on top level (refer to flow sheet), and mixing cone is just under top level. Idler pully at lower right is for process belt.

study corrosion resistance properties. All vessels, flues, etc., are lined with 20-lb. chemical lead and two courses of acid-proof brick.

Concentrated phosphoric acid is pumped through rubber lines to the triple plant where it is mixed continuously with pulverized phosphate rock. A mixing cone, developed through pilot plant studies, has jets of phosphoric acid introduced in the lower portion and pulverized phosphate rock is fed in the top of the cone over a weigh belt. The mixture of rock and acid flows in a thick slurry to a rubber belt that is moving continuously under the cone. In approximately 15 minutes the acid-rock mixture sets up on the belt to a "cake" that is moist but easily broken up in a disintegrator.

From the disintegrator the fresh triple is conveyed to a Gates designed granulator where it is rolled into small spherical shapes. The granulated material then passes through a 60-ft. drier which is heated by a coal stoker furnace. "Curing" and drying is accomplished simultaneously under controlled conditions.

The Finished Product

After drying, the product is screened over vibrating stainless steel screens and subsequently packaged. Approximately 20% of the drier product is screened out as oversize and "fines" and returned to the granulator. In practice as well as in the pilot plant operation the elapsed time from mixing cone to the bagging operation is approximately 2½ hours. The triple plant has a capacity of 100 tons of finished product a day.

The finished product is one in which the granulation prevents the setting-up or caking during storage and can be applied to the soil by broadcasting, drilling or airplane. Gates Bros. guarantee 42% P_2O_5, minimum available, and the Idaho State Department of Agriculture reports show they can produce 48% P_2O_5 product.

What caused Gates to improve on conventional design and procedure for producing fertilizer

AMONG THE CHEMICAL products which the West has been demanding is more fertilizer, and the establishment of the ninth triple superphosphate plant in February last year at Wendell, Idaho, has helped considerably in overcoming the shortage of this product.

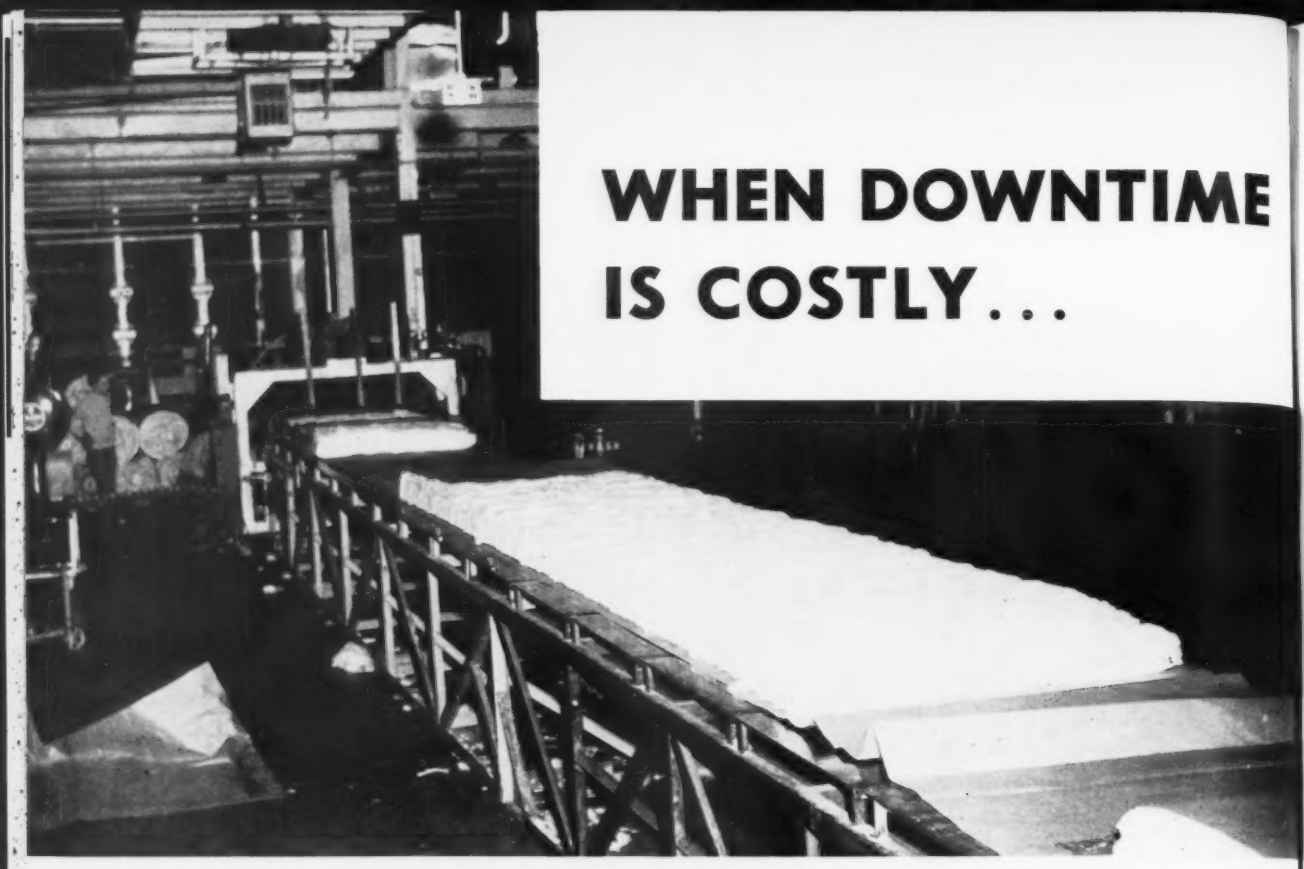
The shortage had impressed Charles T. Gates, who had established in 1939 a farm equipment agency in Wendell to serve the Magic Valley agricultural area. A truck and tractor agency followed, later an automobile agency, supply parts and repair service, and along the way Charles Gates' younger brothers, Quincy and John, joined him. As farm machinery was difficult to obtain in wartime, a machine shop and assembly plant for producing farm equipment was set up.

When he decided on the high analysis phosphate venture, Charles Gates found most plant entrances closed to him, the literature vague on critical manufacturing procedures and experienced technical personnel unavailable. Leaning heavily on TVA experience in manufacturing triple, the technical staff set about to improve on the conventional design and procedure for producing phosphoric acid and phosphate fertilizer.

A group of engineers was assembled under the direction of George F. Wilkins, general manager, who has been associated with the heavy chemical industry for 20 years as a chemical engineer. Gerald H. Lewis, a chemical engineering graduate from U.S.C., handles the research and development phases of the operation. Engineering layout of the plant is in the hands of Larry M. Buhler, and Frank E. Johnson is in charge of production. The work of these men is augmented by a staff of two chemical engineers, a chemist and an agronomist.

The members of the Idaho Farm Bureau Federation assisted Gates Bros. in financing the plant and are the distributors of the product.

WHEN DOWNTIME IS COSTLY...



Production area of the new Owens-Corning Fiberglas plant. The firm manufactures insulating materials of fibrous glass composition.

The Importance of Spare and Standby Equipment

By *HARRY A. WILLOUGHBY*, Plant Engineer
Owens-Corning Fiberglas Corporation, Santa Clara, California

IN ENGINEERING and equipping for operation, careful consideration should be given to the use of spare equipment and standby equipment. This is particularly important during these days of industrial uncertainty, when materials are difficult to procure, delivery schedules are a thing of the past, and we have no control over dealing with suppliers.

When our plant was designed, our needs were reviewed, with special consideration being given to what would happen if we had a power failure. What might develop, for example, if our gas supply were suddenly cut off—or if some component part of our manufacturing production gear should fail without warning? None of these possibilities is uncommon to an operation such as ours or any other plant that is engaged in a manufacturing process.

Our plant is engaged in the manufacture of Fiberglas products, and we employ glass furnaces. It is very important that we keep these furnaces operating on a schedule 24 hours a day, seven days a week. This means that we must be assured a constant supply of both power and fuel.

If we should not have power to supply cooling air for combustion and controls, or fuel for firing our furnaces, we would be forced to shut down the production operations and cause considerable damage to these furnaces.

For the most part, these problems were satisfied by (1) standardization throughout the plant, wherever possible, and (2) by providing standby equipment in our operation where we felt that this type of equipment was necessary and standardization was not possible.

In the designing of our production equipment careful consideration was given to standardization. Our engineering department endeavors to design into new equipment, as far as possible, materials that are presently in use in the plant. Sometimes, as a result, it is necessary to oversize a gearbox, or to use a bearing or a chain larger than necessary.

When Engineering has completed designing a piece of equipment, prints are sent to Plant Engineering. Ther the prints are reviewed and standby items are ordered—or existing standby equipment is checked to see whether we are covered for breakdowns or any other possible emergency.

Such a program of standardization enables us to carry a minimum of spare or standby equipment.

THIS MONTH'S PLANT, described from the construction standpoint, is Owens-Corning Fiberglas, at Santa Clara, California. It is selected because of the type of operation it performs. Like many other Western plants, it operates on a 24-hours-a-day basis, and must keep up that schedule.

Because it processes glass, the glass furnaces must be kept fired up on an around-the-clock schedule. If the power supply should be shut off, extremely costly downtime would result. If anything else should happen to interrupt the production process, the whole operation might suffer considerably. Hence, both standby equipment has been installed where possible, and standardized equipment has been employed where feasible.

To assure that the plant maintains a constant source of electric power, there has been installed a Nordberg Diesel and a 500-kw. G.E. a.c. generator. This combination assures adequate standby power for continuous operation of the furnaces.

In event of a power failure, not more than about a minute's time would be lost before that Diesel could be put into operation to pick up part of the plant lighting and power load. Provision of that equipment is certainly better than rebuilding a glass furnace.

Steam is used in the production departments. Boiler burners are fired by either gas or fuel oil. The glass furnaces are equipped with combination oil or gas burners.

Having available these alternates —gas or fuel oil—assures Owens-Corning that the production department will be in full use the year around. Otherwise, during the winter months when domestic gas consumption reaches peak use, this plant, like many other industrial consumers, might suffer when the fuel supply is cut off, temporarily.

...IT PAYS TO HAVE STANDBY EQUIPMENT

If your production processes necessitate 24-hours-a-day operation, you can take some tips from this description of the new Owens-Corning Fiberglas plant

Owens-Corning Fiberglas manufactures insulating materials for domestic, aircraft, industrial uses. All these materials are of fibrous glass composition.

To a large extent, this plant is highly mechanized. Mechanical equipment that is used is regulated and operated by automatic controls. Since the main feature of this plant is the inbuilt equipment (rather than the building construction, *per se*) we have sought to emphasize those component factors that contribute to the plant's production.

PLANT FEATURES . . .

FLOORS

Plant floors are all 5-in. reinforced concrete. A. C. Hornstone floor hardener applied to the entire surface of plant. General office area floors are of asphalt tile 9- by 9-in. by 3/16 in. thick.

STRUCTURAL STEEL

Steel (Bethlehem Pacific Coast Steel Corp.) was erected in accordance with specification set by designers. Riveted type construction used throughout the plant.

SIDING

Plant manufacturing and warehouse area is of corrugated galvanized sheets, 24 gauge copper bearing steel, galvanized after being formed. All pieces prefabricated and cut in East Bay Sheet Metal Works shop.

MASONRY

Construction material consists of Hadite Blocks, Glazed Tile (Kraftile #300 clear glaze buff) manufactured by Kraftile Co. Glass block manufactured by Owens-Illinois Glass Co. Hollow tile partitions and Gypsum Block partitions. All materials laid, cut, fitted around pipes, boxes, etc., and cleaned to produce neat and clean appearance.

ROOF

Roof is of steel rock deck manufactured by Detroit Steel Products Company, formed from standard copper bearing steel sheets 1¾ in. deep, 18 and 20 gauge.

Fiberglas 13/16-in. thick roof deck insulation applied over the Detroit steel deck. Over the insulated steel roof deck, 3-ply Fiberglas mat and roofing asphalt were applied, and covered by a gravel surface.

WINDOWS

Garage windows are Soulé steel sash. Other plant windows were furnished by Michel & Pfeffer Iron Works. They are commercial pivoted windows with iron staybar for ventilators within reach of floor. Pivoted vents that are higher have hardware consisting of snap-lock, roller and chain cleave necessary for chain operation.

STRUCTURAL GLASS

Gray vitrolite is installed in various lavatories throughout plant and medical centers. Structural corrugated glass in some office partitions. All supplied and installed by Cobbledick-Kibbe Glass Co.

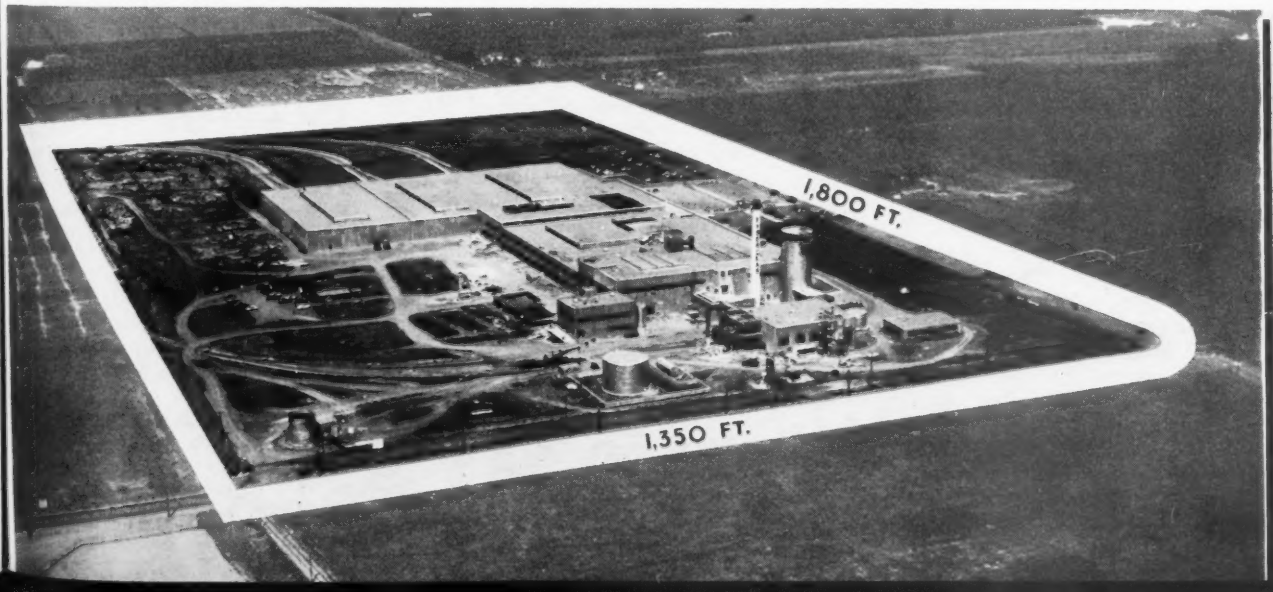
GLASS

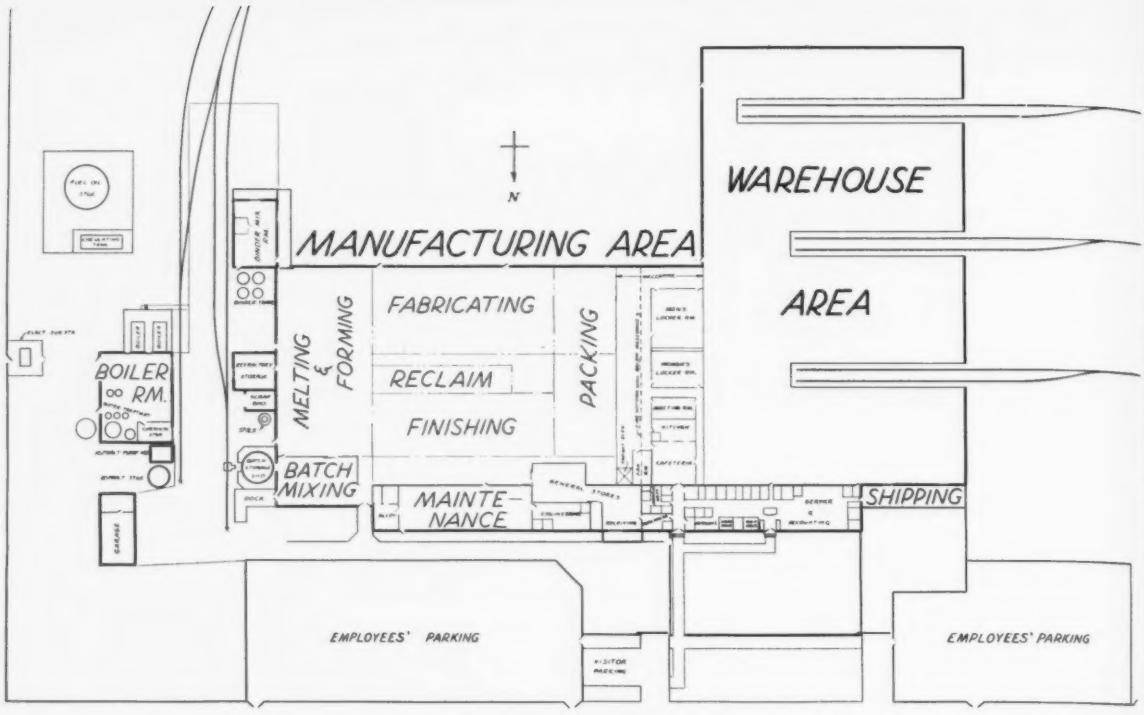
All sash are glazed with a product by Libby-Owens-Ford Glass Co., handled by Cobbledick-Kibbe Glass Co.

PARTITIONS

Production offices are constructed of metal partitions fabricated and installed by E. F. Houserman.

Air view of the new plant. All buildings are of steel frame with corrugated galvanized sheet steel siding and 5-in. concrete floors.





Plan of the new Owens-Corning Fiberglas plant. (Compare with aerial photo on preceding page.)

Office partitions are Kaylo veneered panels, with Kaylo doors. Kaylo furnished by Dahlstrom Metallic Door Co.; mill work by Pacific Manufacturing Co.

Fire walls are of corrugated sheet metal with Fiberglas preformed backing. Shop and storeroom walls are of building blocks.

CEILING

Fiberglas plain acoustical tile suspended ceiling in office area, cafeteria and conference room, to deaden sound and make a pleasant working atmosphere.

PLUMBING

Storm, sanitary and process sewer form a net of underground piping varying in size from 30-in. diameter to 2-in. diameter. Material of clay, concrete and cast iron.

In the plant there are four Bradley wash fountains. Standard & Koehler provided 27 showers, 18 toilets, and 16 urinals.

LIGHTING

All wiring for lighting is in conduit or raceways. Incandescent lighting is used throughout the plant approximately 20 ft. from the floor with an intensity of 25 foot candles at desk height.

Daylight enters plant from north and south sides and through glass in monitors. Glazed area takes up about 25% of floor area.

COMPRESSED AIR SYSTEM

Compressors located in the power house supply all requirements for plant operation.

Two Gardner-Denver 11 by 6 by 9 Model P.T.C. single tandem, two-stage horizontal air compressors. One Worthington duplex two-stage feather value compressor. Compressor capacity is higher than demand to permit plenty of standby air, in case of emergency and to service equipment properly, air being used throughout process.

STEAM SYSTEM

Two Riley steam generating units supply continuous capacity of 40,000 lbs. of steam per hour at 250 lbs. operating pressure.

These boilers have completely automatic combustion controls (Wheelco) and are designed to operate on either gas or fuel oil by employing a Leahy Multi-jet, type ESC, combination gas and oil burner.

The Buffalo Forge induced draft fan is driven by type DP16 horizontal shaft General Electric turbines and 15 hp. Reliance Motor, Fiberglas insulated.

Panel and equipment are Bailey Meter Co. products.

Present plant rquirement is one boiler in operation; the second boiler used as a standby.

PIPING

Pipes run through the plant carrying raw water, treated water, steam (high and low pressure), air, gas (firm and interruptable) fuel oil and asphalt. These lines are supported from purlins or on columns. Lunkenheimer, Edwards, Hancock and Crane valves used throughout the piping system. Crawford, Spencer, and Reliance regulators used on pressure reducing stations.

SPRINKLER SYSTEM

A Grinnell automatic sprinkler system is installed throughout the plant and offices. Constant pressure is maintained on systems by a 100,000-gal. elevated water tank fabricated and installed by Pittsburgh-Des Moines. Hose reels containing 100 ft. of hose are distributed throughout plant and yard.

WATER SYSTEM

Plant water is supplied from either of the 600 ft. deep wells. Pumps were furnished by Food Machinery Corp. One pump is 100 hp. (General Electric Motor) 1,000 gpm.; the other is General Electric DP16 100-hp. steam turbine right angle Gearturbo drive, output 1,000 gpm. This combination assures a water supply at all times.

Quantities of treated water are used throughout the plant for cooling. Water treating is done by Spaulding Precipitator and filters and Permutit hot-lime soda softener. Catchment

tanks are 6,000-gal. capacity. Two filter pumps are capable of delivering 400 gpm. at 140-ft. head. They are Ingersoll-Rand Model 3CRUH. One pump is powered by a 20-hp. G.E. motor; the other is driven by a G.E. turbine. This permits operation on steam or electrical power.

Zeolite water softener is installed to permit removal of regular softeners from service for repairs.

HEATING

Space heaters (Janitrol) gas-fired, are located throughout the plant. In the office areas heating is done by air conditioning equipment; this equipment is thermostatically controlled, both for heating and cooling. There are no humidity controls.

ELECTRICAL SYSTEM

Power at 12,000-v. purchased from PG&E enters the plant through Westinghouse switch gear and is carried underground to a sectionalizing station where it enters three 3-phase 1,000-kva. and one 3-phase 750-kva. substations (all Westinghouse). The entire plant operates on 440-v., 60-cycle, 3-phase system. Lighting and control circuits are 110 volts. Lighting transformers are distributed throughout the plant; control centers (G.E. and Westinghouse) are used for control and circuit protection.

A Nordberg Diesel Engine (with 9-in. bore, 11.5-in. stroke operating at 720 rpm., and delivering 718 bhp.) drives General Electric alternating current generator type ATI 500 kw., used as a standby in case of power failure. This equipment is not provided to carry the entire plant load, but operates when emergency power is essential.

MATERIALS HANDLING EQUIPMENT

Raw batch materials for glass manufacture are unloaded into a hopper, carried from the hopper to a vertical elevator some 75 ft. high by means of belt conveyors. This elevator discharges the material in a 2,000-ton segmental storage tank. (Tank fabricated and erected by Pittsburgh-Des Moines.) Materials are weighed as they come from batch silo, on Toledo exact-weight scale, and are discharged into a Smith Mixer in 4,000-lb. mix. All conveyors and the elevator from unloading to mixing are provided by Stephens-Adamson. After mixing, this material is emptied into a can carrier (capacity 4,000 lbs.) and carried to the furnace hall by skip hoist, placed on the Tramrail Monorail system. Batch mixing is completely automatic.

At points where scrap occurs, scrap is emptied into elevators and removed by means of overhead belt conveyor to disposal points.

A pneumatic conveyor system is provided throughout the plant to be used in cleaning and dust pick-up.

Other individual items of equipment are Ruggers cranes, Towmotor lift trucks, Mercury tractors and Mercury trailers for handling finished and in-process materials.

CONTROLS

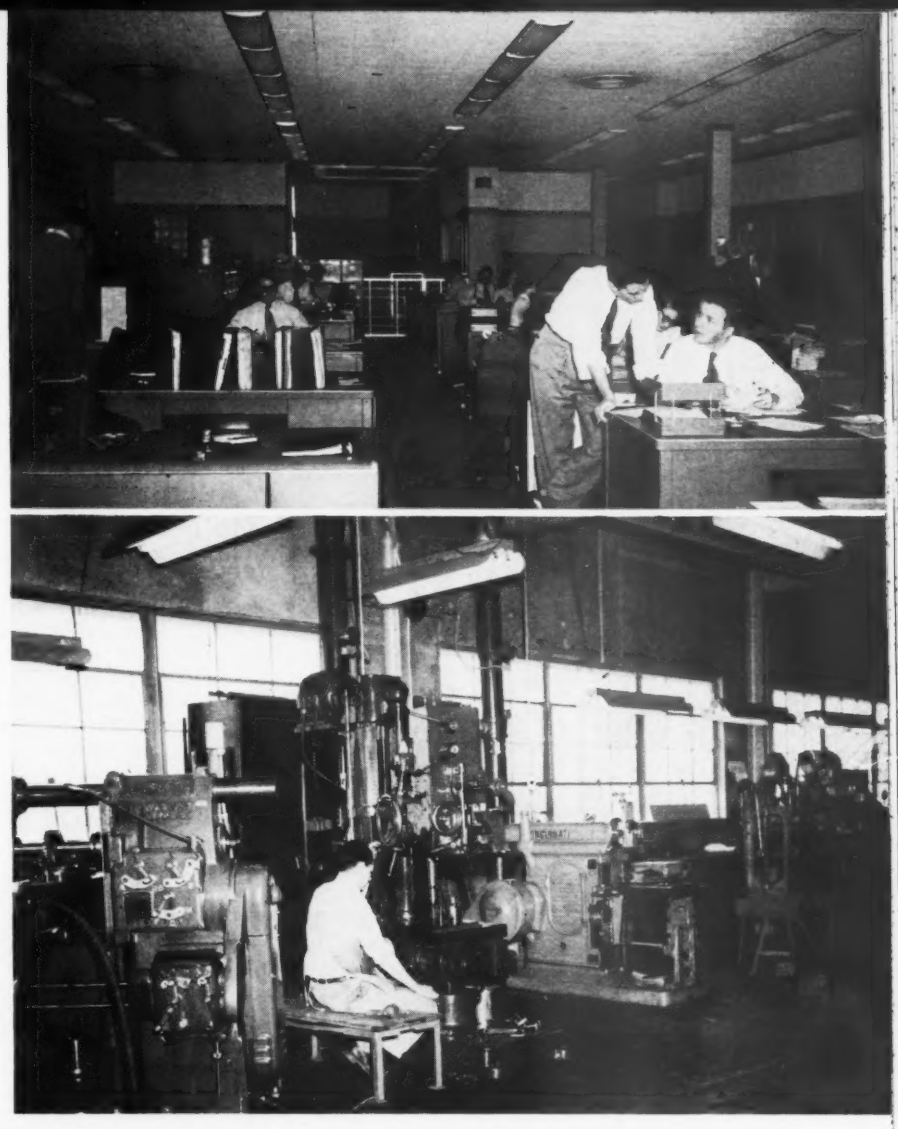
Automatic controls are employed throughout the plant. Glass furnace employs Askania controls; boiler has Wheelco controls; oven has Brown controls.

FENCE

Entire property is enclosed with Cyclone fence (about 6,300 ft.).

PARKING FACILITIES

Over 81,480 sq. ft. of paved area is provided, including parking facilities for at least 330 cars.



TOP—Office area. Floors here are of asphalt tile. All lighting is incandescent.
BOTTOM—Machine shop, an important function of the maintenance department.

WE PICKED A WINNER

LAST MONTH *Western Industry* carried a story concerning a new building in San Carlos. The article was entitled "Make Your New Plant Easy on the Eyes."

Apparently this plant was easy on the eyes of the judges at the American Institute of Architects convention in Chicago, held May 7-11. In this, the 3rd national competition, "our" plant ran off with second prize for industrial buildings. The blue ribbon was awarded a Coca-Cola plant in Houston, Texas.

Again, Westerners have demonstrated conclusively that they have progressive industrial tendencies. Our congratulations to Electronic Engineering Associates, Ltd., and the office of Francis Joseph McCarthy, architects for the winning plant.

Sash entering the flow coat painting unit. The coating process does not require any interruption in the movement along the conveyor, whereas with the dip method it is necessary to have a drop section at this point and to index hooks over the tank, then move them back after dipping.

FLOW COATING

saves time, avoids batch spoilage

Dipping process eliminated in painting and bonderizing steel sash. Monorail system keeps product on conveyor line continuously without interruption or slow-down

SOULE' STEEL Company, major Pacific Coast manufacturer of steel casements, in order to insure a high quality finish on their products, have installed in their Los Angeles plant what they feel to be the latest type of sash bonderizing and painting equipment. It is one of the few steel sash installations in the country using a continuous monorail and flow coating painting system.

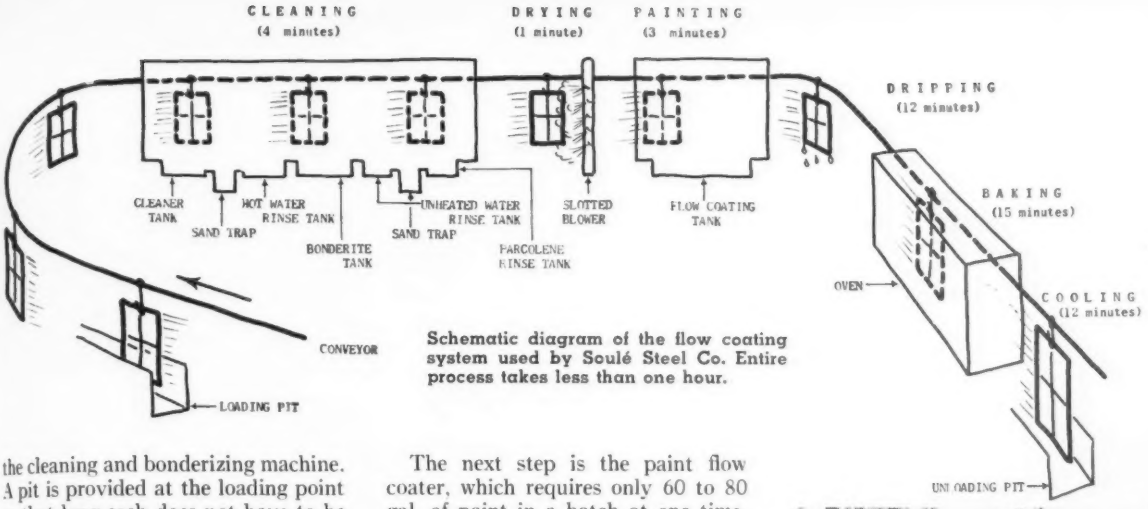
The sash remains on the conveyor from the time of first loading until it comes out of the oven. In the dip process, which is in general use, the hooks on which the sash travels have to be switched out of the conveyor line for the dipping operation, thus slowing up the movement and necessitating the presence of an operator at this point.

Flow coating also eliminates the danger of spoilage of a large batch of paint, through foreign objects getting into it, or by spoiling.

The conveyor in this plant is a 4-in. I-beam monorail, approximately 1,000 ft. long, using 458 chain and Gray hub trolleys 24 in. on the centers. The load bars are 10 ft. long, notched so the hooks for the sash can be put anywhere on the bar and any shape of sash handled. The trailing support is equipped with a roller arrangement to compensate for the foreshortening of the chord going around the turns.

After being loaded on the conveyor hooks manually at the starting point, the sash travels around a turn and into

Large and small sash traveling along conveyor line. A long pit under dip in conveyor at far left facilitates loading larger sash.



Schematic diagram of the flow coating system used by Soulé Steel Co. Entire process takes less than one hour.

the cleaning and bonderizing machine. A pit is provided at the loading point so that long sash does not have to be lifted up by hand to engage the conveyor hooks.

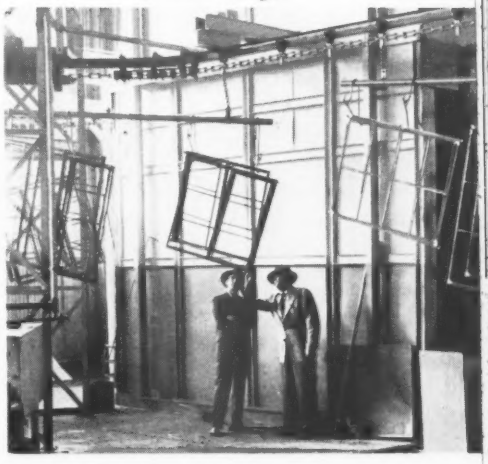
The bonderizing timing is as follows: cleaning 60 sec., rinsing 60 sec., bonderizing 60 sec., rinsing 30 sec. in unheated water, and then a 30-sec. parcolene rinsing. Operating temperatures are as follows: cleaning 160 deg. F., rinsing 160 deg. F., bonderizing 135 deg. F., and parcolening 165 deg. F. Heat is supplied from a boiler producing approximately 100 boiler horsepower at 80-lb. pressure, all of which is used to heat the solutions in the cleaning and bonderizing machine.

When the sash emerges from this machine, it is automatically blown off by a blower with a slotted duct on each side of the sash to remove any remaining pockets of solution, and dried automatically by its own heat.

The next step is the paint flow coater, which requires only 60 to 80 gal. of paint in a batch at one time. The flow coating process does not require any interruption in the movement along the conveyor, whereas with the dip method it is necessary to have a drop section at this point and to index the hooks over the tank, and then move them back again after dipping.

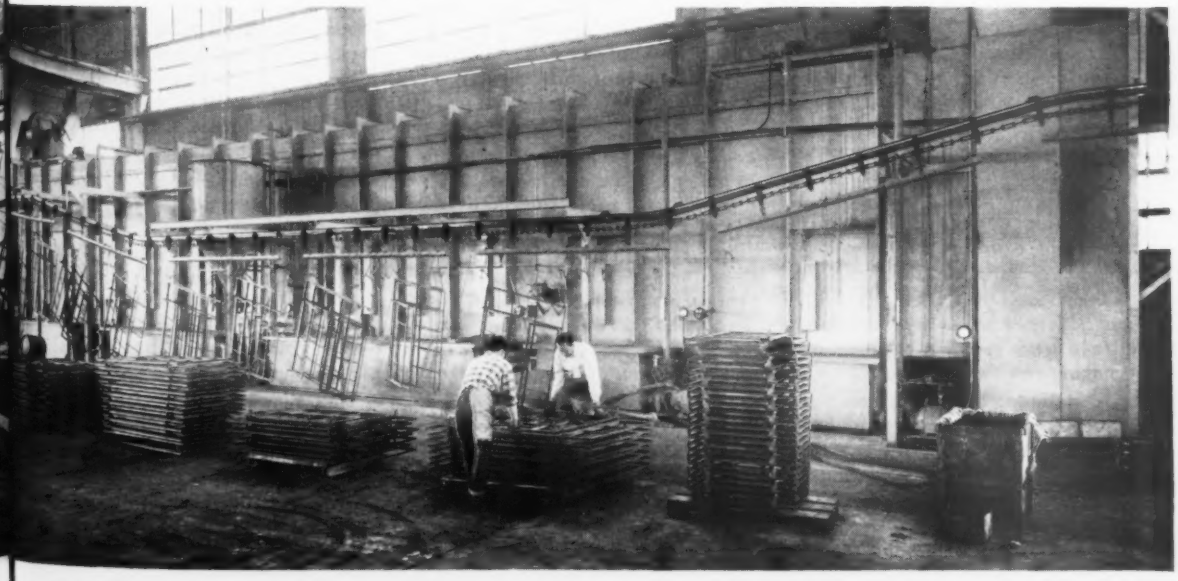
After the flow coating has been completed, there follows 12 minutes of drip time while the sash moves 90 ft. into the oven, where baking at 300 deg. for 15 minutes in a direct-fired gas oven takes place. After leaving the oven, the sash travels 12 minutes before reaching the unloading zone and is cooled enough to unload.

The installation was designed by R. A. Brow, M.E., and built by Pacific Coast Industrial Equipment Company, Los Angeles.

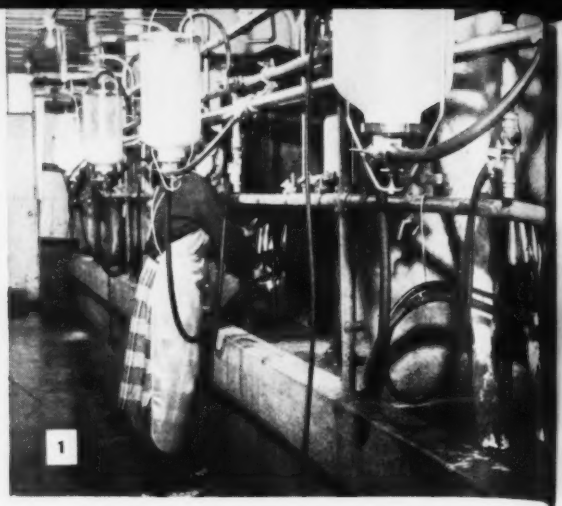


Conveyor turn after leaving paint baking oven. Note load bar arrangement to allow for foreshortening during the turns.

At the unloading point, painted sash is stacked on pallets for shipment. Cleaning and bonderizing equipment is in the background.



FRESH WHOLE MILK IN CANS



1. Bossy's in the milking parlor, getting pumped dry. Large glass jars are weigh jars. Milk goes directly from teat cups to weigh jars without air contact. Then it goes to 100 or 200-gal. "farm tank" via pipes, still under vacuum and without cooling.

Revolutionary new process combines "flash" pasteurization with sterile canning in superheated steam under electronic robot control. Method has possibility of widespread use.

CANNING of fresh whole milk, dream of the dairy industry, the canning industry and the American housewife for many years, is now a historic reality. Dr. Roy R. Graves, agricultural scientist (formerly with the U. S. Department of Agriculture), inventor of a process to accomplish it, says that 2,000 gallons of milk are now being canned each day in three-quart cans at the Med-O-Milk dairy in East Stanwood, Washington, to be shipped to Alaska, Japan, and the armed forces.

Dr. Graves' process replaces conventional pasteurization of milk with sterilization. During the process, milk is never exposed to air from the time it is taken from the cow until it is sealed in the can. Canning is done in an aseptic atmosphere of superheated steam under electronic temperature control.

Aseptic canning is the invention of another research scientist, Dr. William McKinley Martin. Electronic controls were developed by engineers of the

Flavor and storage-ability have been the problems

CANNING FRESH MILK is not a 1951 development. Major milk processing companies have been doing it for years, and selling a product that is commercially acceptable in some areas. The main drawback to greater sales was the cooked flavor and the brown color, which made it undesirable in this country or in areas where fresh milk was available.

Technically, two problems exist, and both must be conquered before canned fresh milk is a commercial, economic reality. They are:

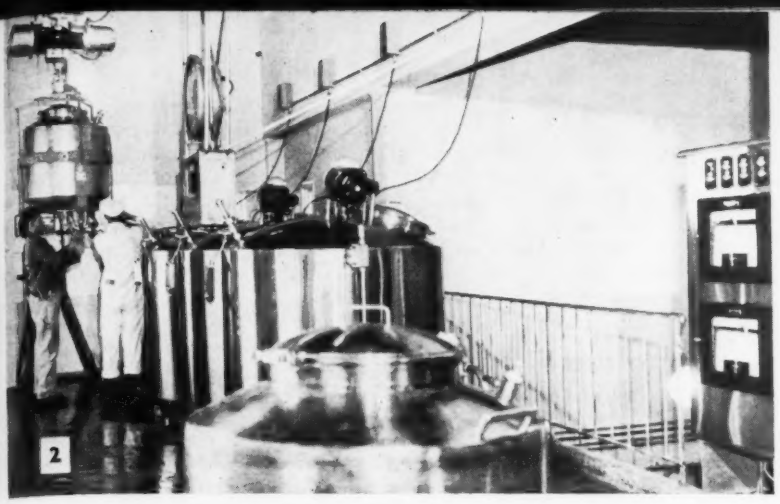
1. Steril:zing the milk to free it of all bacteria and other factors that tend to destroy its taste and render it unacceptable;
2. Getting the sterile product into sterile cans in such a way that the product will retain its fresh milk qualities under storage for a reasonable length of time.

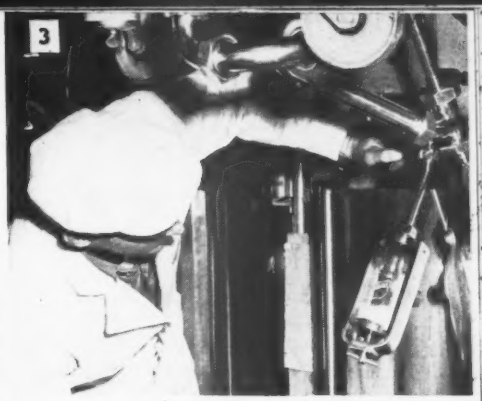
Part 1 of this order has heretofore been accomplished by sterilization of the milk in the can, by heating it at a relatively low temperature (245 deg. F.) for a long time (15 min.). That process, however, tends to produce a milk with cooked flavor and brown color. Sterilization at higher temperature (278 deg. F.) and for a much shorter length of time (8 sec.) results in a considerably less cooked flavor and considerably better color than the former process.

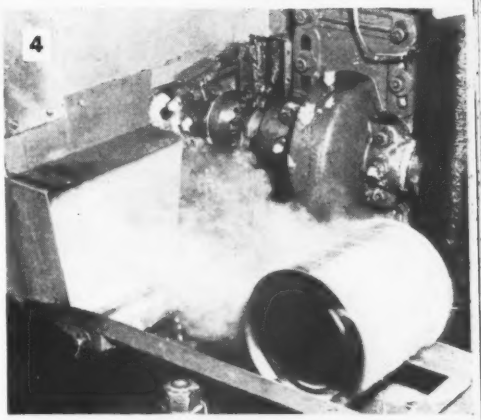
Dr. Graves' process is one of the methods developed to produce a fresh milk tasting product that will withstand lengthened storage. Other milk processing firms are working on the same problem (retaining the fresh milk taste after prolonged storage) and have been, for years. From time to time, we presume, these other milk processing firms will announce their findings and methods.

At this writing, fresh whole milk in cans is being produced by at least one of the major firms and sold in Alaska and the Pacific islands. That firm's sterilization method is somewhat different from Dr. Graves', but the end resulting product is competitive.

Part 2 of this order is solved by the Martin aseptic canning process. This article discusses both the Martin process (canning the product only) and the Graves process (one method of producing the product by sterilization).







2. Farm tank is hoisted on monorail to be weighed and then connected to plant's storage or processing tanks.

3. Inspecting a sample extracted from farmer's milk during transfer from farm tank to storage tank. Milk is checked here for butterfat content; then tank contents are brought to proper butterfat test by addition of cream or skim milk, under vacuum. Bacteria count is also taken.

4. Filled and sealed can, pursued by puff of steam, rolls out of canning machine to be weighed and stacked. Present operation uses hand weighing. Automatic cooling and weighing will be installed.

5. "Pea Soup King" Robert Andersen (Andersen Foods, Inc., Santa Barbara, Calif.) studies printed record of "watchdog" of new canning system in his plant. Lantern-like screened object to right of clock is red light bulb alarm that goes on, along with loud horn signal, when temperature failure is detected anywhere in system. Solenoid switch goes into action immediately, and automatically rejects any cans filled before canning is stopped. Brown instruments control this application of the Martin system.

Brown Instruments division of Minneapolis-Honeywell Regulator Company.

Dr. Martin conducted his research with the James Dole Engineering Company, at Redwood City, Calif. James D. Dole, Hawaiian pineapple pioneer, heads that firm. Products ranging from split pea soup to fresh milk shakes have recently been canned by the Martin process.

Advantages Are Many

In commercial operations, this new process presents three prime advantages over conventional in-the-can sterilization. They are:

1. *Product quality.* Sterilization (high temperature for a short time) seems to be a functional reason for better product quality. For most food products, it has been found that flash sterilization produces an end product with better flavor, vitamin content, color, and texture than the former (conventional) process of sterilization after canning.

2. *Size of container.* Regardless of container size, product quality remains constant with the new method. Baby food in baby-size cans, or soups or milk in institutional-size cans are packed without reducing product quality.

3. *Safety margin.* Milk is subjected to high temperature for such a short time that it does not have a chance to overcook or scorch. A wide latitude of time is afforded before such action would take place. Process time could be increased to as much as ten times the rate required for complete sterilization without producing any perceptible difference in quality.

For application of packers processing large quantities of liquid or semi-liquid products, this Martin process offers these further advantages: It can handle consumer-size cans at speeds up to 300 per min.; it is simple in design, economical in use of fuel, water, and labor, and can be readily adapted for handling of any of the standard can sizes.

Safeguards for Sterility

Extensive precautions are taken at all stages of production to safeguard the product's sterility. Although this sterility is assured primarily by the design and construction of the processing equipment, automatic measuring and controlling instruments have been used to insure the maintenance of processing conditions that are essential to safe operation.

A novel triple-safe system was devised, in which three separate, unrelated safeguards function to guarantee against possible contamination. Recording controls are used at critical stages of the process to maintain temperatures to sound alarms or shut down the process in the event they should vary beyond pre-set limits. Vital temperatures are grouped on a single chart by a multi-point recorder, which can be easily consulted by the operators.

No Prolonged Treatment

Primary feature of the Martin process is sterilization of containers and closures and the filling and sealing of them under aseptic conditions. The high-speed continuous heat exchanger of conventional design for heating and cooling is uniquely applied to many of the products to be processed in this equipment.

A great advantage is gained here by heating the product in a relatively thin film which is spread over a large heating area, assuring instantaneous heat penetration and eliminating localized overheating. This does away with one of the greatest shortcomings of in-the-can sterilization, the need for pro-

longed treatment in order to insure heating the material long enough to be sure that the product in the center of the can reaches the required temperature.

Heat Exchanger Adapted

At this point (the heat exchanger) Dr. Graves offered the invention that applies the Martin process to fresh milk canning. To can pea soup, for example (as is now being done by Andersen Foods, Inc., Santa Barbara, Calif.) the heat exchanger is a series of pipes. To can milk (as is now being done by Med-O-Milk at East Stanwood, Washington), Dr. Graves' heater is one consisting of a steel block with small spiral passages through which the milk passes at a high velocity and is heated by steam surrounding these passages.

After sterilization, the milk goes to a cooling unit which reduces the temperature of the fluid to 110 deg. F.

The product is cooled in a heat exchanger similar to the sterilizer, but with cold water flowing through the system to provide rapid, efficient cooling of the hot material. A controlling thermometer measures the temperature of the outgoing material and regulates a pneumatic control valve to adjust the flow of water, so that the material leaving the cooler is at precisely the optimum temperature for filling. This instrument also furnishes a continuous record of the product temperature for future reference. From there it goes to the Martin canning machine.

Steam Atmosphere for Sterility

The sterile product, flowing continuously from the cooler, is fed into sterile cans passing through the filler. Filled cans pass directly to the closing machine to be sealed with sterile covers. To prevent the entry of airborne bacteria into the system, an atmosphere of superheated steam is maintained in the filler, the closing machine, and the interconnecting conveyor system.

A check on the temperature of both filler and can closer is provided by the multiple recorder and again low-temperature alarms are provided for extra protection.

Graves has eliminated all bacteria in the milk subjected to his process by sterilizing it at a minimum temperature of 278 deg. F. for 8 seconds. Not all milk will withstand this treatment, Graves acknowledges. Milk that he uses must have a high heat stability.

In Everett, Washington, Isaac Rygg and Sons, owners of Meadowmoor Dairy, heard of Graves' accomplishment and thought the process an ideal supplement to their operation. They had been shipping milk in paper containers by plane to Alaska at an appalling cost of 30 cents per quart.

By adopting the Graves process of handling canned mlk, Med-O-Milk has reduced that figure a good deal, although a specific figure is not available at this writing.

Sterility at the Udder End

Any cow lucky enough to be favored by the Graves process has at least a measure of special treatment. The cows, owned by farmers who are roughly within a 35-mi. radius of the Med-O-Milk plant, are milked in a specially designed "milking parlor" which permits simultaneous milking of from three to six cows.

Each cow's udder is sprayed with hot water and wiped clean with a paper dispensing towel before milking begins. Teat cups are attached immediately, and the milk is drawn off into the weigh jar.

When the cow is milked dry, a system of valves enables the farmer to shut off the intake line and expel the milk from the weigh jar into a pipe line which carries it immediately into the farm tank. That tank has a 100 to 200 gallon capacity; it is vat-shaped and completely sealed, under constant vacuum.

By piping the milk directly from the cow's udder to the vacuumed farm tank, the Graves process makes a major change in milk handling on the farm. Cooling and carrying the milk are entirely eliminated, thus greatly speeding the task of the farmer—besides safeguarding the milk.

Graves likes to recount the report of one farmer using the process who started milking his 60 cows at 4:30 p. m., and by 6 p. m. the job was finished and the farmer was in the house for dinner. A woman said that with the new method she is able to milk from 80 to 90 cows in a little over two hours.

Processing Techniques

At the plant, the farm tank is raised by an electric hoist which works on a live weigh rail. After being weighed, the farm tank is coupled to one of four processing tanks into which the milk flows to be mixed, warmed, and sampled. In order to break the vacuum in the tank and start the milk flowing, nitrogen gas is introduced into the system. Nitrogen, being inert, is not soluble in milk and acts further to protect the milk from contact with the air.

From the processing tanks, the milk goes into a homogenizer, and from there into a heat exchanger where a Brown diversion valve diverts the milk that is not up to the minimum 278 deg. F. necessary to sterilization.

Two three-way valves maintain a constant flow in the lines between the homogenizer and the heat exchanger, eliminating any possibility that the vacuum in the pipes should be lost. A pressure-pickup instrument transfers the condition of the lines to a Honeywell instrument, which in turn activates a solenoid coil to operate the valves.

Cans and lids used in the Martin process are all bathed in steam that is superheated by gas burners to 420 deg. F. Cans continue their trip into the filling compartment, under enough steam pressure to exclude any air. A sealing machine completes the sealing process, leaving a vacuum in the cans of 13 to 14 inches.

The Possibilities

Dr. Graves estimates that his process will preserve milk in cans without heavy refrigeration for six months to a year. Though plans call for future expansion of production at East Stanwood to 1,000 gallons an hour, up to this writing there has been no domestic marketing.

As to price, this canned milk will be probably about the same as fresh milk or perhaps slightly lower. Market potential is not even dented as yet: it runs the gamut from ships at sea to milk-hungry foreign countries that could beneficially consume our domestic surplus.

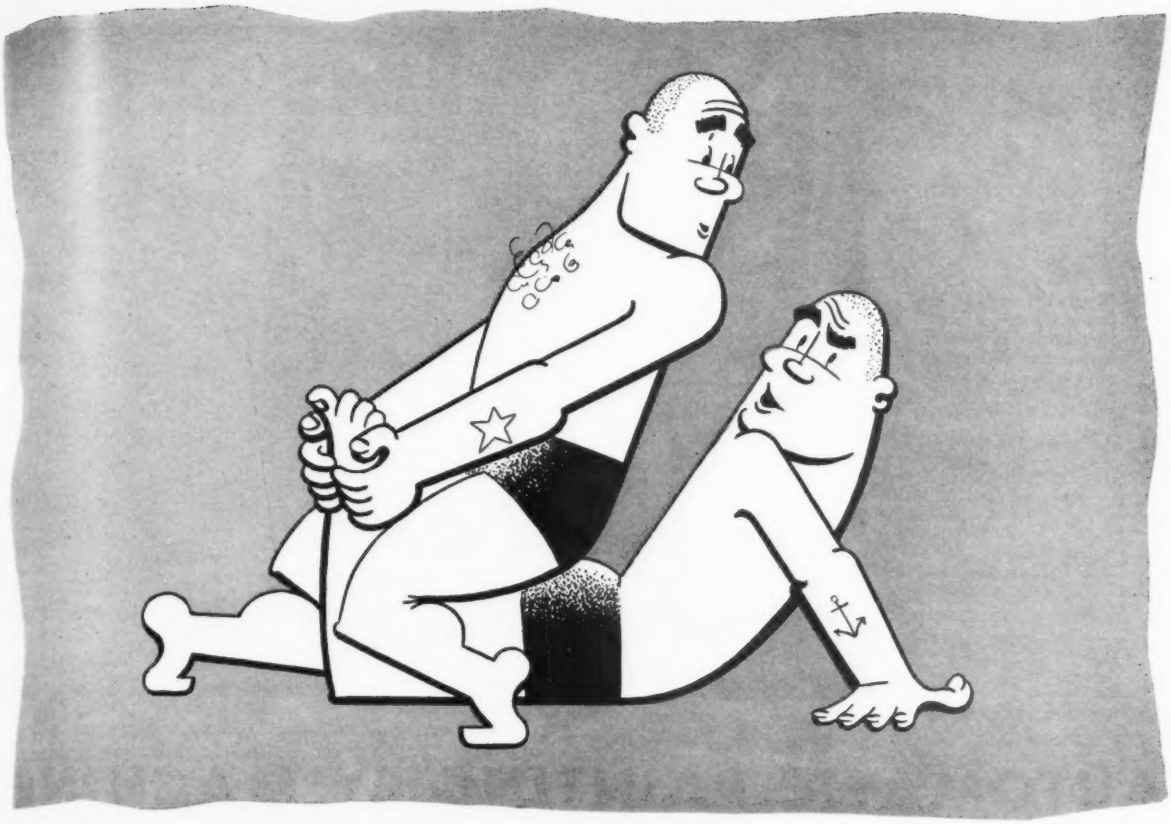
Why Milk May Not Taste Fresh

THERE ARE FOUR basic reasons why the taste of milk may be other than normal or fresh, as the housewife knows it:

1. It can be tainted by flavors from feed, gasoline or oil fumes, or other sources;
2. It can be transformed by bacterial action;
3. It can become changed by the action of an enzyme (the lipase enzyme in milk tends to break down the fatty acids);
4. It can be changed in flavor by oxidation.

Pasteurization is ordinarily accomplished by raising the temperature of the milk to between 161 and 162 deg. F., and maintaining it at that point for 17 to 18 sec. Bacteria that survive this treatment remain to act on the milk sugar and proteins to give an off-flavor after storage.

Pasteurization will kill pathogenic organisms, although some organisms, while not ordinarily detrimental to human health, will remain to cause a souring action. Sterilization eliminates the souring potential in milk.



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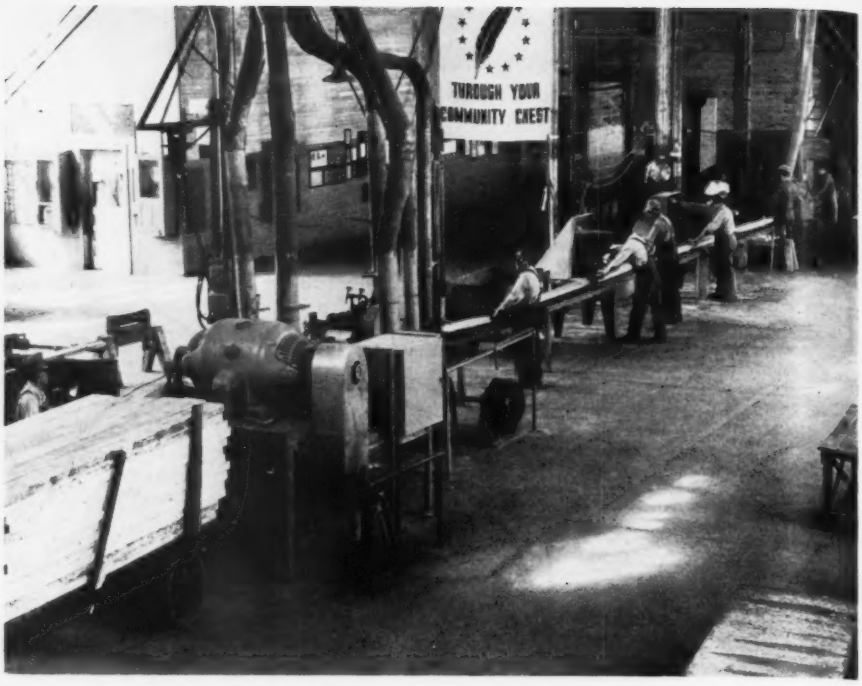
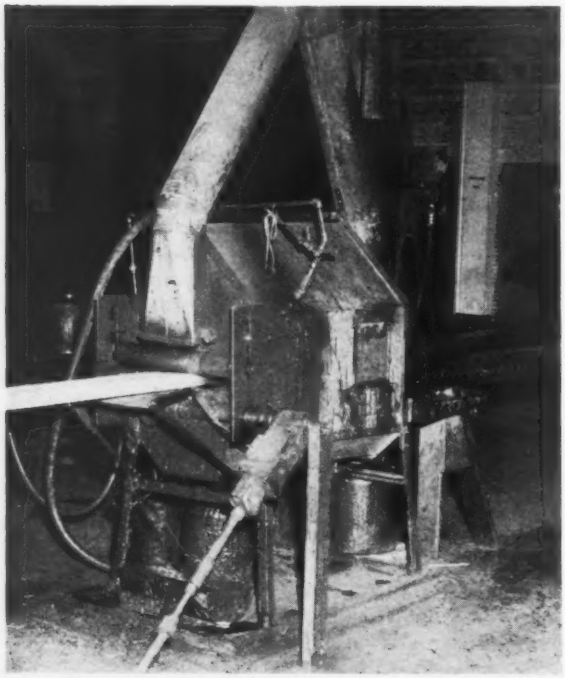


Production line at Santa Fe shops in Albuquerque. Lumber is milled and primed or painted on the same run.

AUTOMATIC PAINTING BY MACHINE

(four sides of a board at once)

New machine developed at the shops. Clear board passes into it and emerges on the other side fully painted. Handling of material is reduced to a minimum.



PAINTING PROBLEMS exist in railroad shops as much as they do in other industries. For example, Santa Fe shops in Albuquerque faced the painting problem of too much handling of material through ordinary paint spray operations, or dipping of the lumber in order to apply a priming coat.

After sufficient thought and design was given to the subject, a new machine was developed to eliminate those costly factors. Illustrated: (left) the machine in operation with a white board passing into it and emerging on the other side fully painted; (top) a production line for milling lumber and priming or painting it at the same run.

As designed, the machine shows a box-like structure with two paint spray nozzles inserted at such angles that each nozzle paints two surfaces of a four-sided piece of lumber as it passes through the machine. The lumber enters between a pair of rollers, and is propelled through the machine by a pair of sprockets. Those sprockets are shaft-driven by a compressed air motor.

Paint spray nozzles are mounted to standard paint spray machines. Both nozzles spray continuously. Surplus paint is drained through the bottom of the machine into buckets, and it is returned to the machine's paint tank at such time as the air pressure is released.

Air ducts carry off any over-spray, which might be objectionable to employees in the vicinity.

Speed of the machine (for driving lumber as well as for painting operation) is adjustable to fit into the speed of other operations on the same run, such as surfacing, gaining and cutting the lumber to length.

HOW 80 FIRMS TRAIN SUPERVISORS

Survey reveals that only one-third of Bay Area firms require study of personnel department policies, about half make use of time and motion

HALF DO and half don't. This was the outcome of a survey of the popularity of supervisory training programs among firms employing from 100 to 500 people in the San Francisco Bay Area made by Richard E. Erickson of the business administration extension division of the University of California.

Of some eighty-odd firms surveyed, 54 of whom were manufacturers, here are some of the facts discovered:

1. Only about one-third of firms considered the matter of having supervisors understand the policies of the personnel department important enough to devote study to it.

2. Only eight firms made specific references to training in cost control which is presented to their supervisors.

3. Fifty-four companies out of 66 reported that their supervisors have some teaching responsibilities in regard to quality control.

4. Out of 78 reports, 55 showed motion study was practiced, but only 48 out of 79 made use of time study techniques. Eleven make use of motion study but not time study, four time but not motion, and 44 make use of both time and motion. Only six firms making use of time studies are non-union, which tends to invalidate the belief that unions outlaw time study.

5. Six companies included some training in fundamentals of planning and scheduling.

6. Of 39 firms having some form of supervisory training, only eight made specific references to efforts to develop teaching supervisors.

Education, ability, experience and personality ranked about even among the main factors considered in selecting students for supervisory training. Despite the fact that half of the firms surveyed have specific supervisory training programs, only about one-third of them required supervisory training for supervisory positions.

Arrangements for payment for training vary, and examples are as follows:

Company Pays All

1. Full payment by company.
2. Books furnished and examination fees paid on passing grade.
3. Refund on successful completion.
4. Whole cost when course obligatory.
5. Full cost if applicable to job and passing grade.
6. Direct cost only.

Partial Defrayment

1. Company pays for all but elective and advanced courses.
2. Job requirement course on 50% reimbursement.
3. One-half payment where course related to job.
4. One-half registration fee, advanced to 75% if course completed.
5. Apprenticeship indenture: upon successful completion of course they are reimbursed. All internal programs at no cost to employees on company time; optional external programs at employees' expense and on own time.

Methods of instruction were listed as follows:

Conference	38
Printed matter	26
Visual aids	26
Lecture	25
Staff meeting	23
Individual coaching	12
Others	7

As for the levels of management to which training in supervision is given, foremen ranked first, managers and superintendents second, assistant foremen, subforemen and leadmen third, junior executives fourth and top management fifth.

Forty-six firms reported that they endeavored to determine the effectiveness of training; 18 did not. Here are the methods used:

Consultation with department heads	40
Interviews	22
Collective production records	16
Tests	15
Individual production records	14
Surveys and questionnaires	13
Others	7

Training-Within-Industry Institutes

DISCUSSION LEADING: Portland, Aug. 6.

JOB INSTRUCTION: Aug. 13, San Francisco; Sept. 24, Portland.

JOB METHODS: June 18, Dec. 17, Portland; Nov. 12, San Francisco.

JOB RELATIONS: June 25, Oct. 1, San Francisco; Nov. 5, Portland.

JOB ECONOMICS: Oct. 22, Los Angeles.

T.W.I. Institute Field Representatives: *John B. Calhoon*, Osborn Road, Troutdale, Oregon; *Ken Browning*, 935 Chestnut St., San Francisco 9, Calif.

Are Psychological Tests Useful? Here's What They Say

(19 firms in the Erickson survey use them; 56 do not)

1. They have kept us from hiring men we believe we might have hired had it not been for the test. Where the tests were not definite, we hired a couple of men anyway only to find later we had to discharge them. One man who was hired before taking the test probably would not have been had we had the results of the first test. We had to let him go, too.
2. We have used employment tests since 1937 and have found them valid in over 85% of cases.
3. Best value in use as additional tool in selection for the type of job to be filled.
4. Ours deals with selling intangibles and the tests bring out a man's aptitudes in that direction. Does he like people, etc.
5. In certain limited fields still experimental.
6. Program is relatively new. Hardly time to prove results.
7. Particularly good for clerical operations.
8. Only possible way to determine manual dexterity.
9. Verification studies have shown worth while effectiveness. Tests offered by commercial companies have not proven effective. Are convinced that tests must be developed by the organization which will use them. Tests must be established to conform to all the peculiar aspects of the company and its particular operations.
10. Not in operation long enough to tell.
11. Too new to comment.
12. They help us to eliminate obvious misfits and act as guide in interviewing others. Supplementary use only is made of tests.
13. Perhaps the "yes" should be a qualified one in that we have been using the tests only two months now. However to date we are certainly impressed with the results.

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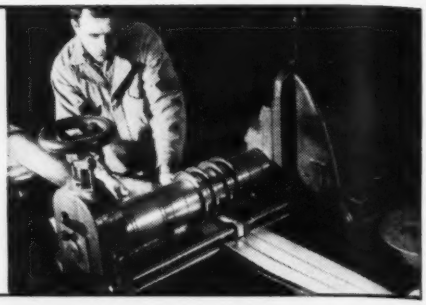

These 7 Chase warehouses do SHEARING

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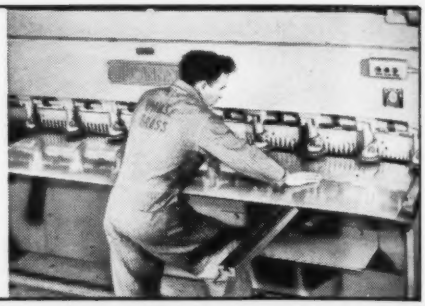
MILWAUKEE
ST. LOUIS
DETROIT
NEW YORK
NEWARK

These warehouses also do slitting



These 4 Chase warehouses do SAWING

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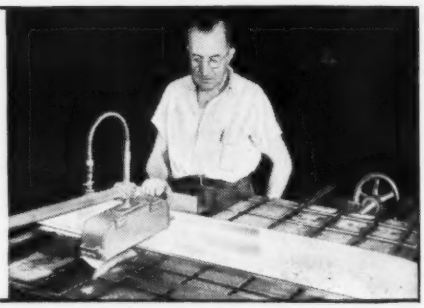
NEW YORK
NEWARK
CHICAGO

These warehouses also do slitting and shearing



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Sixth in a series on water problems

COOLING TOWER EFFICIENCY

By RAY W. HAWKSLEY, Chemical Engineer, San Francisco, Calif.

THE PRIMARY PURPOSE of cooling water is as a heat transfer medium. Waste heat is picked up in one place in the cooling cycle, and disposed of in another place.

After the temperature of the cooling water has been raised, the water is sometimes discharged to waste, after having been used only once. This is called a "once-through" cooling system; and is a wasteful procedure unless water is very cheap and abundant.

In a "recirculating" cooling system, the heated water is passed over a cooling tower or through a spray pond, where its temperature is lowered by evaporation. It is then re-used. Total water consumption in this type system is only a fraction of that for a corresponding once-through system.

Whether the system is once-through or recirculating, certain operating difficulties can arise unless proper water treatment is instituted. Scale can form in heat exchangers, engine jackets, and other equipment. It does so for the same basic reason that scale forms in a boiler—scale-forming salts are less soluble at higher temperatures, and will deposit whenever the temperature rises above certain critical values.

Scale Prevention

Scale forms in the greatest amount at the hottest part of the cycle. It will therefore reduce efficiency (because it is an insulator) in the very portions of the system where it is desired to have *greatest* heat-transfer efficiency.

The removal of scale mechanically or by treatment with acid solvents is more expensive than preventive treatment.

Conditioning of cooling water to inhibit scale formation is radically different from the treatment given to boiler water for the same purpose. In a boiler, the treatment is designed to precipitate the scale-forming salts in the form of sludge. With cooling water, it is designed, not to precipitate these salts, but to *keep them in solution.*

The calcium and magnesium in the cooling water can be prevented from forming scale if the water is treated with "complex phosphate." Examples of complex phosphate are sodium hexametaphosphate (Calgon), tetra sodium pyrophosphate, etc. These materials have the ability to form soluble compounds with calcium and magnesium, which will not form scale under ordinary circumstances.

In addition to treatment with complex phosphate, it is also desirable to adjust the pH of the cooling water, to a calculated value depending on the constituents present in the water, and the operating conditions. Adjustment of pH supplements the complex phosphate treatment, and practically assures successful inhibiting of scale.

Organic additives such as tannin are sometimes used in conjunction with complex phosphate, to protect against adherence of any small amount of scale which may form. Some success has been achieved with the use of organic materials alone, but this method is not applicable to very hard waters.

Warding Off Corrosion

Just as much damage can result from corrosion in a cooling system as from scale. Since the water becomes saturated with oxygen in going over a cooling tower, it is very corrosive. It is usually impractical to remove the oxygen from the water, because it will become re-saturated the next time it goes over the tower. It is therefore necessary to employ corrosion inhibitors to nullify attack by dissolved oxygen.

Many corrosion inhibitors have been tested, with varying degrees of success. Tannin, alginates, silicates, nitrites, amines, chromates and complex phosphates are some of these materials. The best results have been obtained with chromates, or chromates used in conjunction with complex phosphate. The action seems to be that a very thin protective film is formed over the metals to be protected, which minimizes oxygen attack.

Optimum corrosion protection also requires the adjustment of pH, but in the opposite direction from the adjustment necessary for scale protection. That is, raising the pH favors corrosion protection, but increases the tendency of scale to form. On the other hand, *lowering* the pH sufficiently will of itself prevent the formation of scale, but at the same time the water is made much more corrosive.

For these reasons, it is necessary to consider both problems at the same time, and design the method of treatment so that pH is set at a safe value from both standpoints.

In addition to these considerations, it is absolutely necessary that a certain amount of the recirculating water be purged from the system, in order that mineral impurities do not build up to unmanageable values. Quite often this is neglected, especially in smaller installations, with disastrous results. If no purging is provided for, it is impossible to prevent the formation of heavy deposits of scale, no matter how much chemical treatment is used.

Complete Treatment

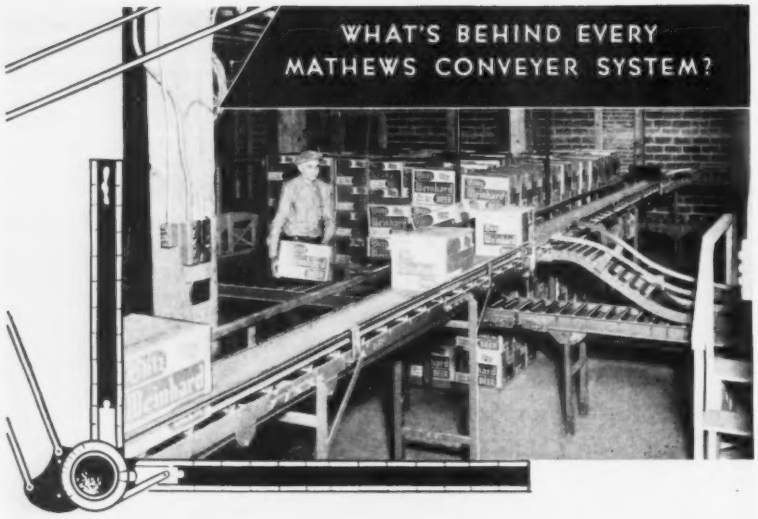
A complete treatment for prevention of scale and corrosion in a recirculating cooling water system would then consist of three factors. The pH would be adjusted (usually by the feed of sulfuric acid) to a value suitable for both scale and corrosion protection. A chemical additive would be used, ordinarily consisting of complex phosphate

Reprints Wanted?

NEXT MONTH this series of articles will be concluded with a table of water characteristics in various cities in the West, supplementing the table that appeared in the November and December issues on cities in the three Coast states. The supplementary table will include more statistics from the Coast, plus information about water in the Mountain states.

As corrosion was adequately covered in earlier installments, it will not be discussed further in this series, contrary to the announcement in our May issue. Qualities of water, water softening, boiler feedwater and water conservation were covered in other installments.

If there is sufficient demand from our readers, the entire series will be made available in reprint form. Those interested are requested to notify *Western Industry* immediately. Reprint prices will be quoted in the July issue.



COOPERATIVE PLANNING

● The best conveyer installations—those which really serve production—are the result of close cooperation between the engineers of the purchasing company and those of the conveyer manufacturer. Such systems are almost invariably the result of the combined effort of many people—people from both organizations—pooling their individual experience, and each contributing to the final result.

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SAN CARLOS, CALIFORNIA

and chromate in balanced proportion. In addition to this, of course, a regulated amount of purging would be performed to keep concentrations at proper values.

It should be noted that the treatment of once-through cooling systems is more difficult than treatment of recirculating systems, for the reason that it is almost impossible to get an adequate degree of corrosion protection without prohibitive expense. The only corrosion protection available is that which results from the use of complex phosphate. While this may under some circumstances give considerable protection, it is usually not as efficient as chromate. And chromate cannot be used because of the high rates of feed which would be necessary in this type of system.

Aside from scale and corrosion, another bothersome difficulty in cooling systems is biological growth. There are two main types of biological contamination. Algae are low-grade plants. Most require air and sunlight, and will be found in storage tanks, cooling towers, or other parts of the system where there is a sufficient amount of

Water Quality Standards Survey

A PROJECT to consolidate all available information on water-quality standards as an aid to water pollution control agencies is under way at the California Institute of Technology, under contract with the California State Water Pollution Control Board.

The project will include study and interpretation of:

(a) Water-quality standards or requirements recommended by the original investigators and researchers;

(b) The range of water-quality standards (upper and lower limits) which would be permissible for varying field conditions and beneficial water uses, again as recommended by the original investigators;

(c) Instances where the standards recommended by the original investigators have been embodied in and applied through ordinances, legislation, and rules and regulations of governing bodies and water pollution control agencies;

(d) Court rulings and decisions which have passed upon the reasonableness or unreasonableness of water-quality standards as established by public agencies;

(e) Bibliography of reference material;

(f) Findings, conclusions, and recommendations on water-quality standards and on additional research necessary.

Dr. Jack E. McKee, Associate Professor of Sanitary Engineering, is directing the project for the Institute.

sunlight. Slime, on the other hand, is bacterial in nature. Most organisms causing slime do not require sunlight, and may be found in any part of the system.

Biological growth can cause trouble through the organisms (of whichever kind) forming insulating layers on heat-exchange surfaces, often in combination with scale-forming mineral salts.

Use Toxic Materials

The remedy is the use of toxic materials to prevent the growth of these organisms. In large cooling systems, chlorine is usually found most satisfactory. However, under certain conditions, other materials may prove more economical, and it is often necessary to make careful studies to determine the best method of treatment.

Bromine has been used successfully as an algicide, and has the advantage over chlorine that it is easier to feed, being a liquid at ordinary temperatures.

Copper sulfate (bluestone) is used in public water supplies for inhibiting the growth of algae, and forms the basis of many proprietary materials sold as algicides.

Phenolic compounds such as sodium pentachlorphenate are sometimes found to be more efficient on a cost basis than copper sulfate, even though their per pound cost is much higher. Blends of phenolic compounds and copper sulfate can be more effective than either one separately.

Quaternary ammonium compounds have been developed which, if used within their limitations, are extremely effective, and are competitive in cost with chlorine.

Since these biological growths are living organisms, they can to a great degree adapt themselves to changes in environment, even to a toxic environment. So if any particular algicide is fed in insufficient quantity, there is a possibility that resistant strains of the organisms will develop, decreasing the effectiveness of the algicide with each succeeding generation.

General Rule to Follow

The general rule is that algicides should be fed in killing doses, and fed intermittently. The killing dose destroys every "individual" then present in the system, and prevents the development of another generation which may be able to resist the toxicity of the algicide. The doses of algicide (about twice a week) come frequently enough that new organisms which have entered the system since the last "shot" are relatively few in number, and readily succumb to a lethal dose.

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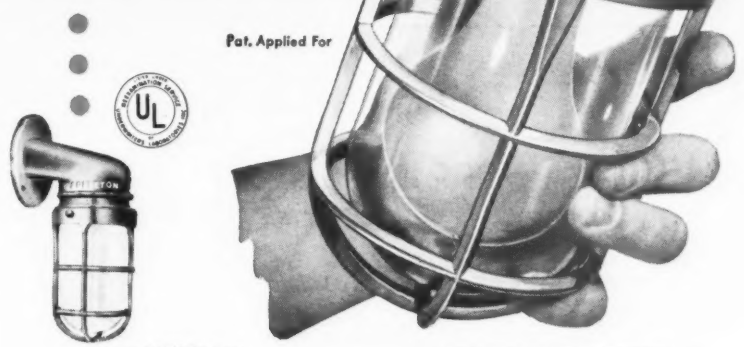

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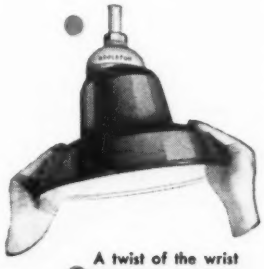

A twist of the wrist attaches or removes reflector

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This outstanding new V-51 line includes 18 different types of rugged malleable iron bodies for pendant, ceiling or bracket mounting. Each body takes both 100 Watt or 150-200 Watt "Unit Assemblies." *Complete interchangeability of parts* permits the assembling of 256 complete fixtures, using only 32 basic components.

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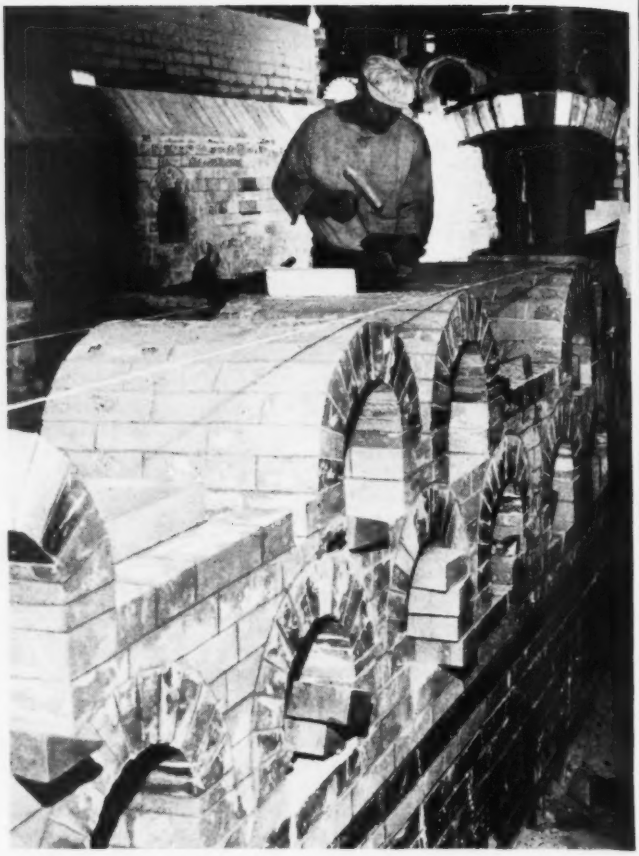

Sewer pipe, spark plugs, pottery and porcelain, bathroom tile, the kitchen sink, fine china on the table—all, take on their useful form in the intense heat of tunnel kilns like the one this brick mason is building. He used firebrick (here in wedge shapes to make the difficult burner port arches) because it will withstand the day-in, day-out destructive action of flame and high temperature.

Gladding, McBean & Co. manufactures firebrick from quality raw materials blended in many different quantities to meet the requirements of any particular service. For example, GMcB Silica Brick will withstand the high temperatures used in making steel in the open hearth furnace; GMcB Fireclay Brick is used in high pressure boiler furnaces, gas generators, industrial furnaces—even the relatively cool home fireplace is lined with firebrick. Many specially shaped firebrick are made to speed construction of roof arches, burner port arches and electric furnace roofs, or to line rotary kilns, large and small boilers, etc. Shapes most commonly used are made for stock, many others are made on special order.

Keeping all kinds of firebrick available to Western Industry, in conveniently located warehouse stocks, is one of the jobs Gladding, McBean & Co. does best. If you use refractories in your plant, and chances are you do, get in touch with your local Gladding, McBean & Co. Refractories Sales Engineer. He has a real interest in your refractories' problems and can save you time and money. Gladding, McBean & Co. is the primary source of refractories for Western Industry.

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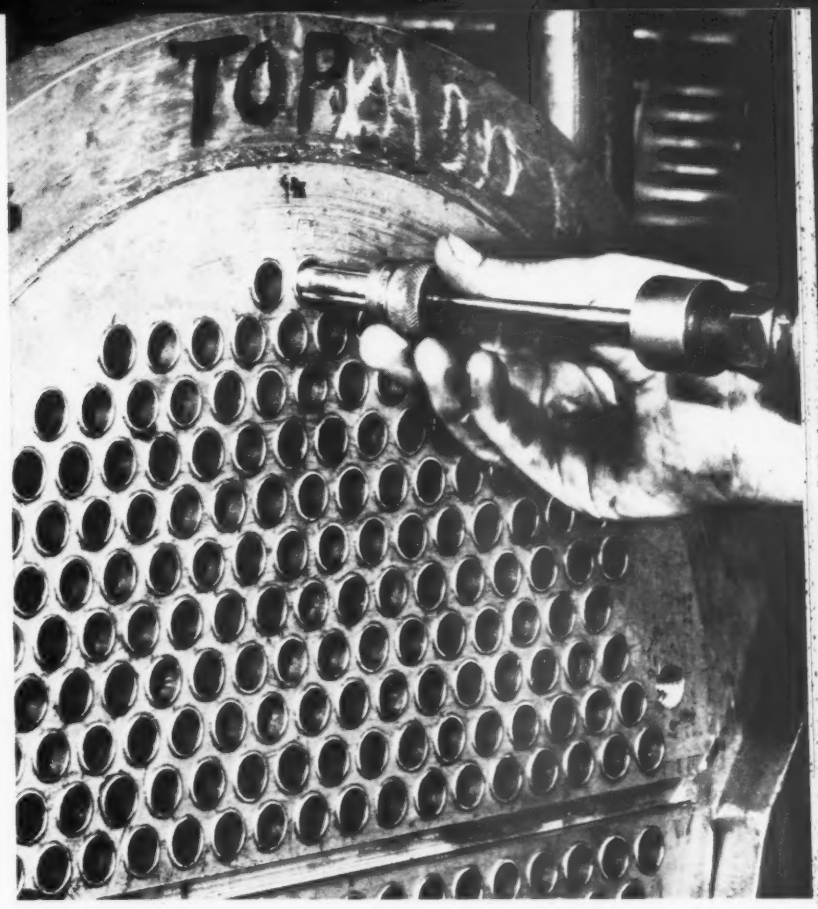


Heat exchanger tubes are now secured in place, leakproof, by controlled expansion. This process bids fair to supersede former methods of tube-rolling

POSITIVE CONTROL REQUIRED TO EXPAND TUBES PROPERLY

By HORACE M. MORAN
Foreman, Heat Exchanger Assembly
C. F. Braun & Co.,
Alhambra, California

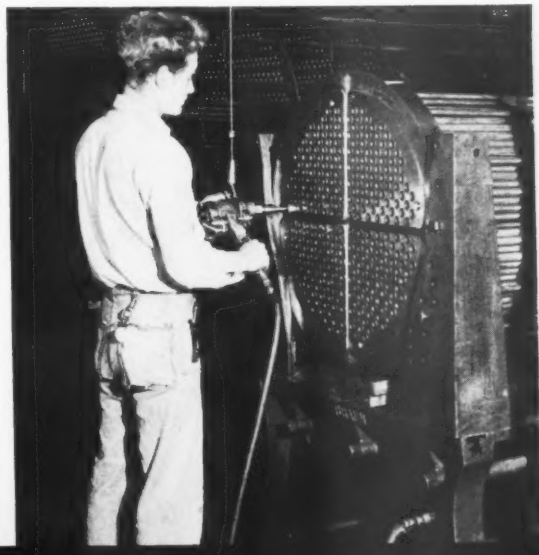
TODAY NEARLY 90% of all fluid-tight joints in tubular products are made by mechanically expanding the tubes into tubesheet-tubeholes.

Tube-expanding may seem quite a simple operation to the casual observer, but there are many problems involved. One of the greatest of these is determining where proper expanding ends and over-expanding begins. A properly-expanded tubejoint is tight and strong. It must be tight to insure against leakage. And it must be structurally strong to support the tubes, and to resist the stresses and strains of temperature-changes.

This article deals with tube-rolling in heat-exchanger manufacture. The principles however, apply to tube-rolling in all tubular equipment. Basic to the understanding of proper tube-rolling is the knowledge of what occurs during the expanding-procedure.

First of all, the tube to be expanded is inserted loosely into the tubesheet-tubehole. Then, a special expanding-tool is inserted into the tube, and pressure is brought to bear on the inside of the tube-end to bring the tubewall in contact with the tubehole. At contact the pressure on the outer surface begins.

The tube-metal is cold-worked and



This jig is used to hold the tubesheets secure while the tubes are being expanded.

flows longitudinally and circumferentially along the tubesheet-tubehole. The longitudinal expansion makes the tube longer, and the circumferential expansion forces some tube-metal into annular-grooves in the tubesheet-tubehole.

As the expanding progresses, there is a period when the tubesheet-metal near the hole reaches its elastic-limit. If expanding goes beyond the elastic-limit of the tubesheet-metal, joint-strength decreases and further expansion only deforms the tubesheet. For proper tube-expansion then, the operation must cease when the metal surrounding the tubesheet-hole is stressed about to its elastic-limit.

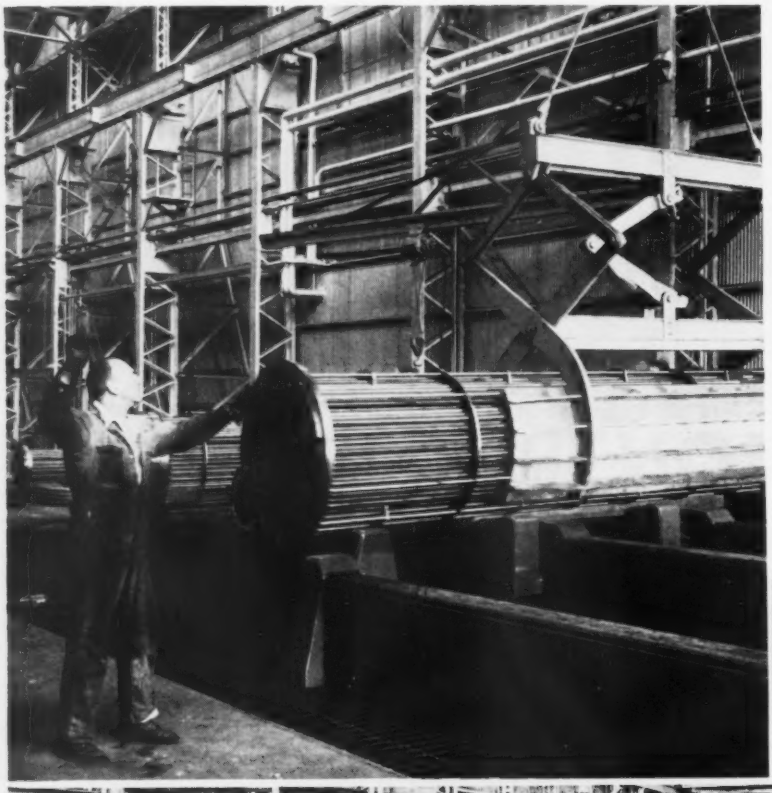
Special Racks and Jigs

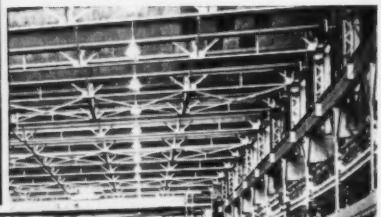
Many manufacturers and users of tubular equipment have no positive control of the amount of tube-expansion. The securing of tight joints is left entirely to the skill and judgment of the operator. He judges the amount of expansion by the feel, the pull, the sound of the motor, and by how far the mandrel travels in the tube-expander. With this method, tube-ends often are over-expanded or under-expanded.

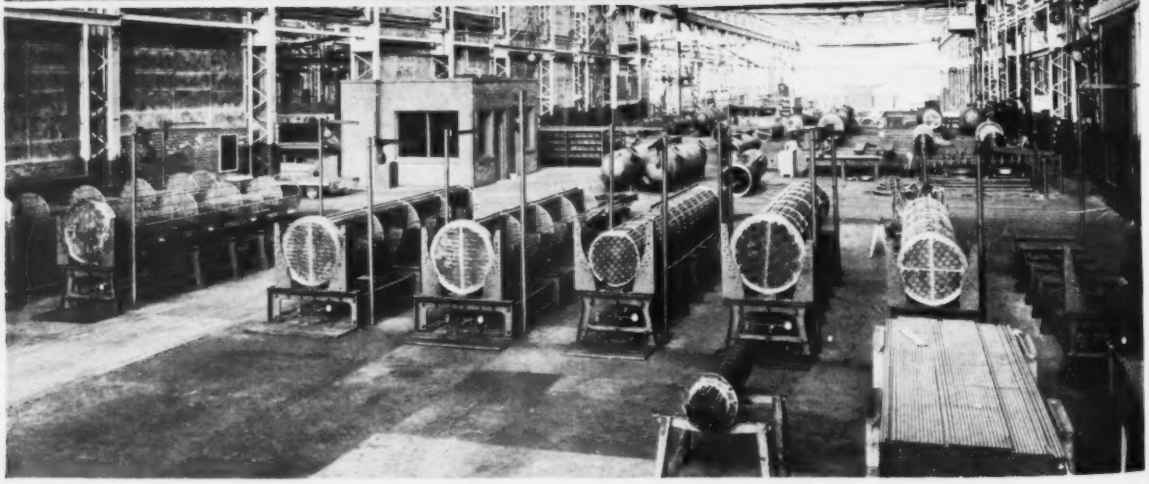
HORACE M. MORAN

At C. F. Braun & Co., advanced techniques are employed which have won them recognition in the field of tube-expanding.

They have developed a tube-rolling method that insures expanding accuracy, and have developed special tools to do it with. The Braun expanding-tool is the 3-roller type, driven by an airmotor. The airmotor is set to shut off when tube-rolling is complete. Care-







LEFT—Moving the tube bundle with this device speeds assembly and prevents damage to the tubes. BELOW—Shop view shows a number of special bundle assembly racks that hold the work in line during the tube-rolling operation.

Natural gas...water...oil... life's daily necessities flow through tunnels of steel. In 1950 alone, the steel used in pipeline construction in the West would have filled a football field with steel plates stacked 21 feet high.

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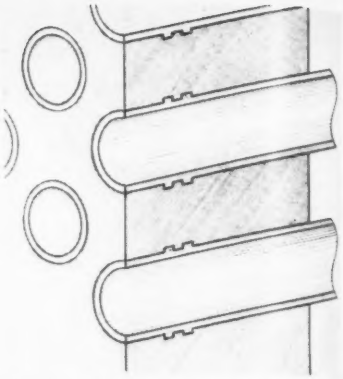
fully-prepared tube-expanding charts give the recommended air-pressure for each tube-material and tube-size.

Correct tube-expansion requires the proper motor for each type of tube-rolling. Incorrect motors can cause tube-failures. High speeds cause high temperatures, especially when expanding tubes of alloy-steel. If the motor-torque is too high, the tubes can be over-expanded. High-speed motors of 3,000 to 4,000 rpm. are well suited for tubes of non-ferrous metal. Tubes of low-carbon steel take a motor of about 1,000 rpm. Alloy-steel tubes require slower motors. Say 500 to 750 rpm.

As far as the actual rolling of the tube is concerned, Braun has found from experience that the most effective procedure is to begin all the expanding either from the bottom or the top of the tubesheet. Two operators, one at each end of the element, roll the same tube at the same time. The expanding follows the tube-rows in a horizontal pattern one row at a time.

The two operators continue the work until the horizontal centerline is reached. Then they start at the opposite edge, top or bottom, and work to the horizontal centerline. This procedure prevents the tubesheets from becoming bowed, and prevents warping of thin sheets.



Two annular grooves in each tubehole lock the tube in place when the tube metal is forced into them by the circumferential expansion.

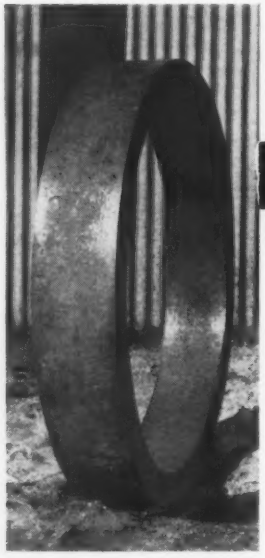
Special Tools and Techniques

Another problem in tube-rolling is to keep the element from getting out of line. The Braun method takes care of this by means of specially-designed tube-assembly racks and jigs. This setup prevents torsion-twist of the bundle during expansion of the tube-joints. The finished bundles are straight and true to dimension, easy to install in the shell. With this method we find that the tubesheets are plumb and level during expanding. Another advantage is that when these tube-assembly racks are used it only takes two men to roll the tubes, instead of the four required under some procedures.

The depth of the expanding from the face of the tubesheet is about ⅛ in. less than the thickness of the tube-sheet, but never more than 2½ in., regardless of tubesheet-thickness. C. F. Braun & Co. many years ago stopped expanding beyond the tubesheet. As a result, Braun has no notching of the tubes at the back face of the tube-sheet.

Braun expands some tubes in two passes. They double-expand when any of the following conditions exist: when the tubesheets are of soft material, when they are thin and large in diameter, when the tubes are spaced close together, or when the tubewalls are thick. The double-expanding operation consists of lightly expanding all of the tubes on the first pass, usually with a high-speed motor. Expansion is completed on the second pass with a lower-speed motor. The first pass sets the tube- and tubesheet-metal, and it prevents the tubesheet from deflecting. In addition it helps prevent the tube-sheets from becoming out-of-round.

Braun expands over three million tube-ends a year using these methods.



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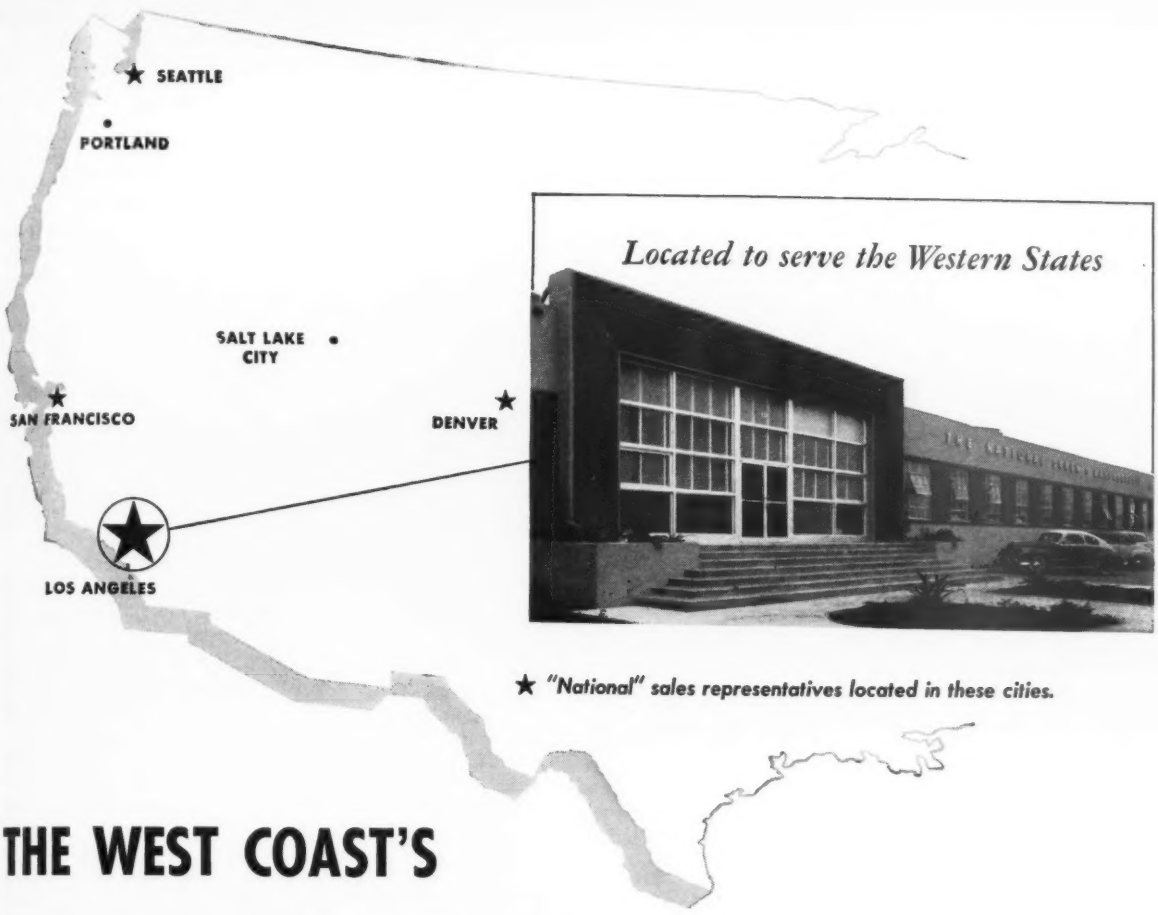

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EFFICIENT HEAT EXCHANGE SECRET OF SHALE RETORT

MANY RETORTING designs have been developed to liberate shale oil from the rock. Most of them employed "external" heat exchange both to raise the temperature of the rock to retorting level and then to condense the shale oil product. These designs led to high initial capital investment, low efficiency, and high utility requirements. A 30-gallon per ton oil shale contains less than 11% by weight of recoverable oil and produces a clinker of the same volume as the original rock. The heat quantities involved in raising the rock to retorting temperature and of condensing the product are significantly large. Thus, highly efficient heat exchange is required in an economical retort. These considerations, according to Homer Reed, of Union Oil Co., were prominent in the recent development of that firm's underfeed retort.

This retort employs a novel arrangement to achieve an efficient heat exchange by direct means. It consists of an inverted conical kiln through which the fresh oil shale is continuously pushed upward from the bottom by a hydraulic-operated ram, with the spent clinker being discharged at the top.

Air is drawn from the top down through the bed where it is preheated by the spent clinkers and burns with the residual carbon-like materials left on the clinker. Hot gases, together with radiant heat, "distill" the shale oil from the rising bed of fresh rock, and as the vapors continue downward toward the liquid disengaging section, they are condensed by contact with the rising bed of cold rock.

No Cooling Water Needed

Entrained oil droplets are removed from the exit gas and are combined with the main shale oil product. Almost perfect heat exchange is attained within the unit without need for cooling water and with essentially no outside utilities. Material balances show the overall recovery of hydrocarbons to be essentially 100%.

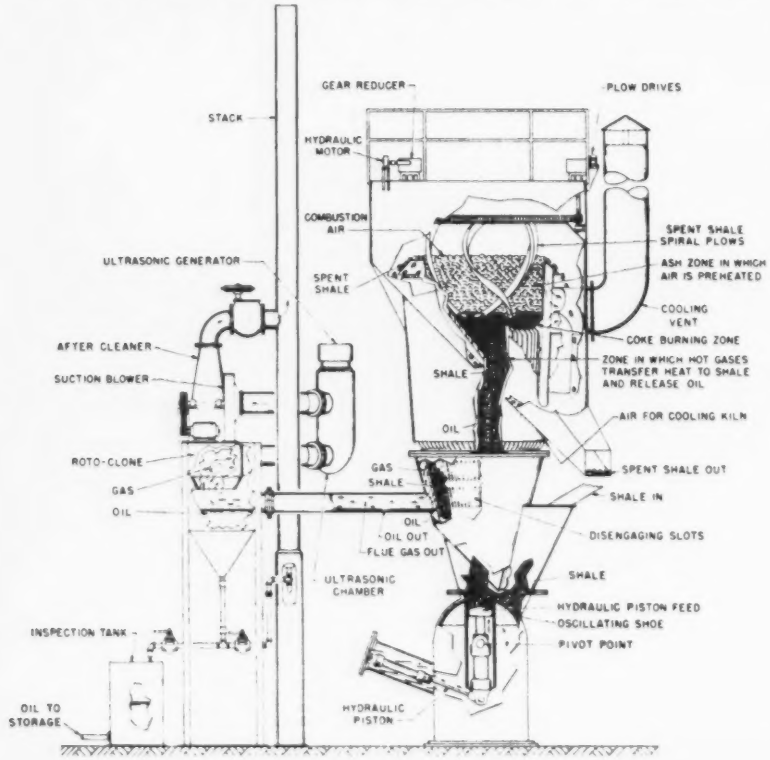
Performance and mechanical features of this retort have been successfully demonstrated in a 50-ton-per-day pilot unit. Preliminary designs have been made for a commercial shale retort with a capacity of 1,000 tons per day. It is visualized that batteries of such retorts would be located near the mine entrance to minimize the transportation of oil shale to the retorts, and that the spent clinkers would be discharged over the cliff face to the ravines below.

Crude shale oil produced from the underfeed retort is characterized by relatively constant quality due to minimum fluctuations in operating conditions. Although shale oil is similar to natural petroleum in some respects, there are significant differences. The most notable are:

1. High nitrogen content.
2. High pour point.
3. Negligible low boiling fractions.
4. Substantial unsaturation.

In addition to a liquid product, retorting produces large quantities of non-condensable hydrocarbons, which, highly diluted with combustion products, comprise the retort gas. Because of dilution, the unit heating value of retort gas is very low; but total quantity is considerable. In fact, the energy value of the retort gas is equivalent to about 25% of the crude shale oil. Production from the Union retort amounts to 13,500 standard cubic feet per ton of oil shale, dry basis. Heating value of the gas is about 80 Btu/SCF, gross.

Down-draft of air is pre-heated and burned when it meets spent clinker pushed upward atop fresh shale, distilling the oil. Rising cold rock condenses the descending vapors.



Retorting Breaks Up Kerogen

These properties are better appreciated when it is remembered that shale oil does not exist in the rock as such but as the organic material known as "kerogen." It is only when subjected to the retorting temperatures that the kerogen is decomposed or split away from the rock with which it appears to be chemically bound.

It follows that even raw shale oil is a cracked distillate with the high reactivity due to unsaturation characteristic of all cracked distillates. Since the kerogen from which shale oil is derived has an average composition,

	%, Wt.
Carbon	69.7
Hydrogen	10.0
Oxygen	15.9
Nitrogen	3.1
Sulfur	1.3

it should be expected that shale oil would be rich in complex organic nitrogen, sulfur and oxygen compounds.

Shale oil has been successfully converted to refined products in the pilot plant by coking, catalytic hydrogenation and catalytic reforming.

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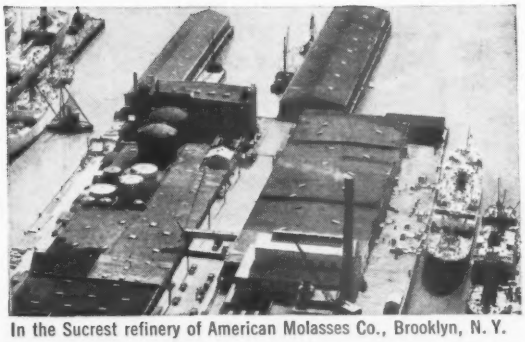
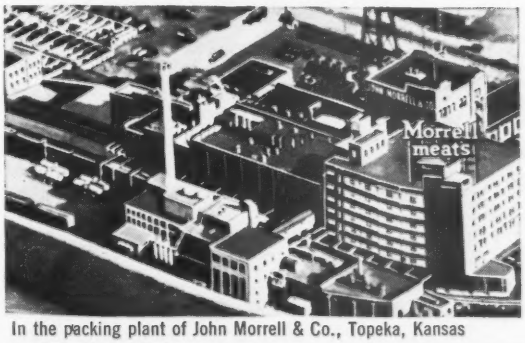
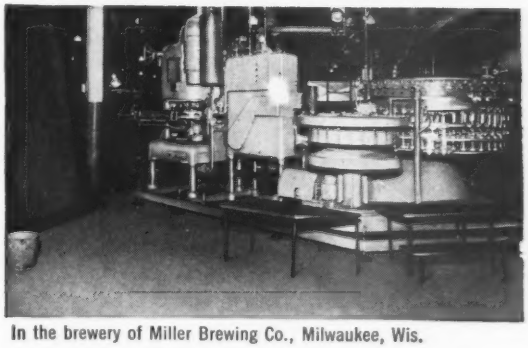


In the Sucrest refinery of American Molasses Co., Brooklyn, N. Y.

In the kitchens of Thrifty Drug Chain, Los Angeles, Cal.



In the packing plant of John Morrell & Co., Topeka, Kansas



In the brewery of Miller Brewing Co., Milwaukee, Wis.

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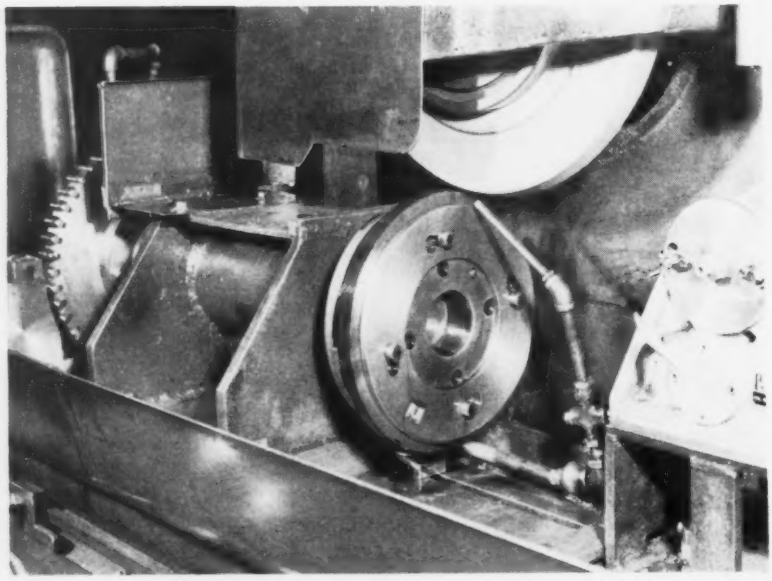
Pre-Hardened Cutter Teeth Did It . . .

Eliminated distortion, scaling and decarburization caused by necessity of hardening after use for cutting aluminum sheet



Set-up on Mattison grinder, showing screen-cutter, form-grinding wheel, indexing fixture and dressing fixture. Cutters can be fed back and forth under form-dressed wheel.

What Troubled the Production Men

A MAJOR West Coast manufacturer of aluminum and aluminum products had developed a method for manufacturing an aluminum window screen of the Venetian blind type by rolling aluminum sheet through a gang of meshing cutting wheels. In order to get into production, however, it was necessary to have an ample supply of cutters, which must be made to exacting tolerances and hardness specifications.

Each cutter was to be 12 inches in diameter, and have 660 teeth on its periphery. The slightest deviation from tolerance in the cutters would result in failure, or at least a screen of unsatisfactory quality.

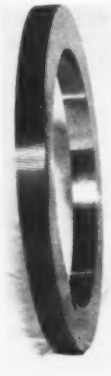
What They Did About It

During the development of the machine, the first cutters used were made by hobbing with a ten thread hob. They were not satisfactory, because a standard hob would not produce the proper undercut in the teeth. More important, though, the cutters had to be hardened after cutting, which resulted inevitably in distortion, scaling, and decarburization.

Western Gear Co.'s engineers (Seattle, Washington) first surveyed all possibilities of hobbing, and came to the conclusion that some method of grinding the cutter teeth in pre-hardened stock would be better. The final solution was through the use of a form-dressed grinding wheel that grinds 15 teeth from the solid at each pass over the work.

How They Did It

The set-up for this job is particularly interesting. A special fixture was built to hold the rings while being cut. This fixture has a faceplate to which the rings are affixed. An ingenious indexing feature that assures perfect accuracy throughout the entire circumference of the cutter is also integral.



Screen cutter (left). Cast-iron crush dressing rolls (in center, below), with carbide forming tool (at right below) that forms the cast iron roller which in turn forms the grinding wheel.

The holding and indexing fixture is clamped to the table of a Mattison surface grinder so that the cutters can be fed back and forth under the form-dressed grinding wheel.

Technique of dressing the grinding wheel is relatively new. A cast iron roller is held in another fixture clamped to the table. This roller has the proper tooth form machined into it by a carbide forming tool that is also a part of the dressing fixture.

The carbide forming tool forms the cast iron roller which in turn forms the grinding wheel. It is especially remarkable that the extreme accuracy can be transmitted from the forming tool to the cast iron roller, then to the grinding wheel and finally to the screen cutters.

What Else They Found Out

With the adoption of this process of grinding the cutter in pre-hardened rings, new problems arose relative to type of steel to use and the proper coolant. Finally, a patent alloy steel was selected that had a desirable combination of machining, heat treating and grinding qualities.

A special grinding oil was selected that had the property of staying on the surface of the cutting edges of the grinding wheel. This property allows the oil to do its cooling during the grinding rather than after, thereby avoiding cracks.

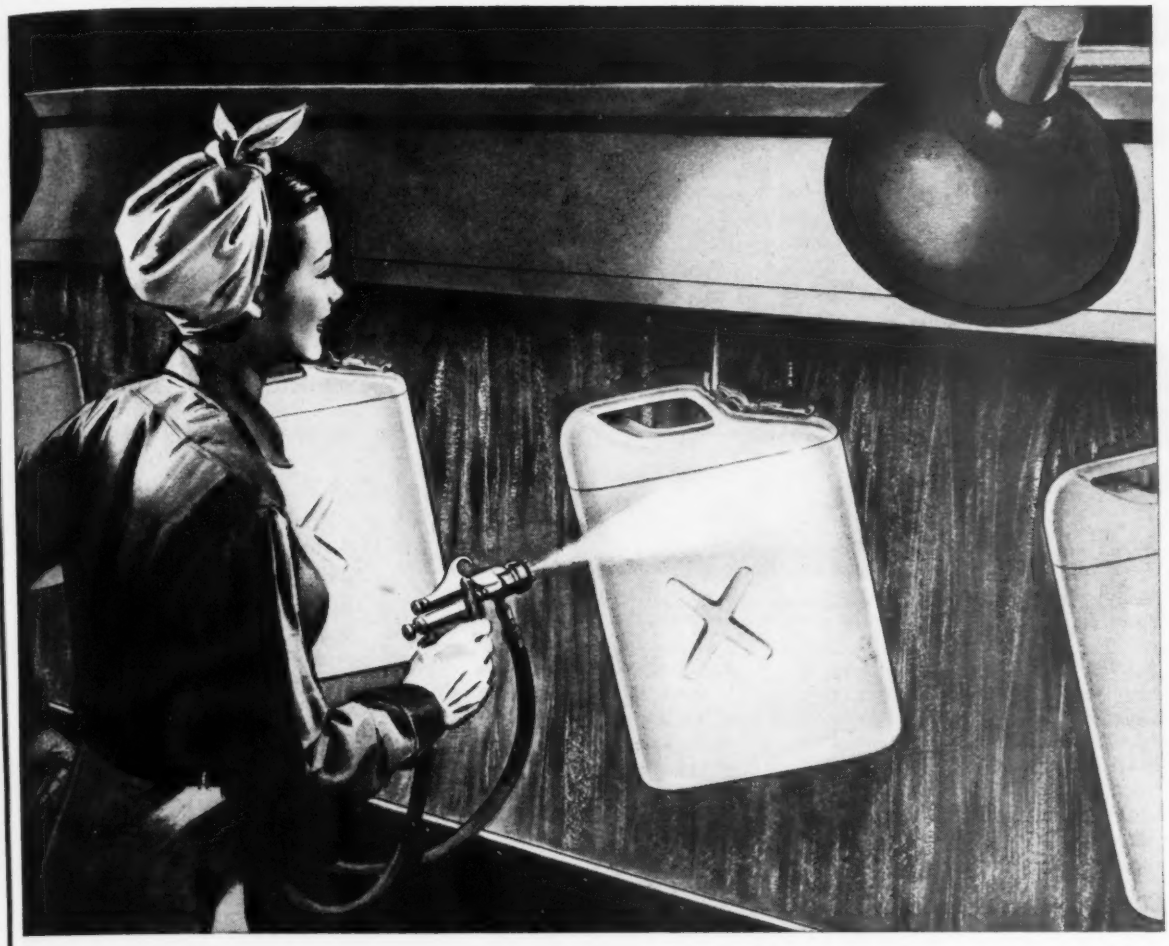
It is noteworthy that the indexing wheel, which is accurate to .0002 in. between teeth, was made in regular production in the Seattle plant gear shop.

CMA Poll Favors Non-Defense Budget Slash

A RECENT POLL by California Manufacturers Association indicates that 87% of California businessmen believe that our Federal budget is excessively large, that non-defense items in this budget should be drastically slashed, and that price and wage controls should be far more severe than those now in effect.

Method of paying for our defense program was the only notable point of disagreement among those polled. Fifty-six per cent favored a raise in taxes to make possible a pay-as-you-go program, while 44% favored a combined policy of taxing and borrowing, according to information received from the Association.

Most views, however, favored reduction of non-defense spending as a method of paring the budget and making existing taxes go further in covering the budget.



Speed at your production lines means speed to the front lines!

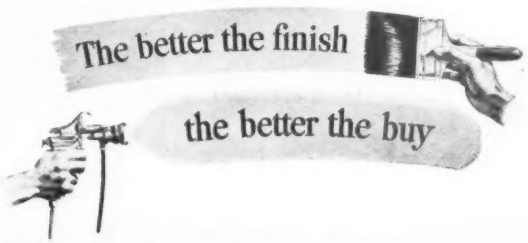
CONSULT YOUR INDUSTRIAL FINISHES SPECIALIST

You're meeting more than consumer demand when you're manufacturing for the armed services. You're meeting demand that might mean life or death, success or failure for our armed forces.

You can't take chances with a finish for fuel tanks, for instance. For World War II, government specifications called for a finish that would resist salt water, sand abrasion, rain, sun and abnormal wear conditions. It was up to Industrial Finishes Specialists to find the answers. Working with government experts, they developed finishes that helped keep fuel moving to the front. Today they are developing special finishes for just about every type of military equipment, and for just about any type of climatic condition that could be encountered.

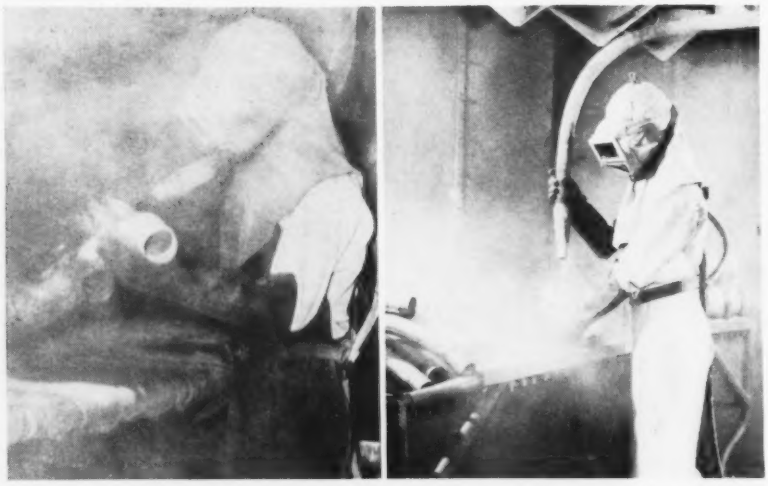
And war-emergency research such as this inevitably results in finer finishes for the products that are bought for the home.

So if you're manufacturing for defense orders, consult an Industrial Finishes Specialist. He can help you solve production and cost problems, maintain product quality, whether for defense or civilian needs.



© 1951, National Paint, Varnish and Lacquer Association, Inc., Washington 5, D. C.

Garnet Sand Better for Sandblasting



Silica sand (left) literally raised a "cloud of dust," because comparatively soft crystals disintegrated quickly. When garnet sand was used (right) atmosphere was clearer.

A LITTLE THING like the type of sand used for sandblasting can make a big difference in both costs and production. For example, Ryan Aeronautical Company, San Diego, switched from silica sand to a reddish garnet variety that comes from a mountainside at Fernwood, Idaho. This is what they found:

1. Sandblasting time is cut in half;
2. Less air pressure is required for the operation;
3. Garnet sand particles do not pulverize as easily as silica;
4. Garnet sand does not generate a "powder cloud" during sandblasting;
5. Garnet sand provides a much more abrasive material than silica.

Examination after use shows that garnet sand crystals do break down, but they retain their sharp features and cutting qualities. In contrast, silica sand disintegrates into rounded crystals that have no further cutting ability.

Although garnet sand is more expensive than silica sand, it lasts much longer and does the job faster. On two eight-hour shifts, for example, the sandblasting machines had to be loaded at least six times when using silica sand. Now, with garnet sand, once per shift is enough.

Less residue also means less of a trucking problem, handling the waste. And in rainy weather, garnet sand (more moisture-resistant than silica) will not clog up as easily; it flows uninterrupted into the sandblasting machines.

Producer of the sand is Idaho Garnet Abrasive Co.

(Upper picture) White silica sand (left) reddish garnet sand (right). Microphotograph of silica crystals (lower left), which break down and round off after comparatively brief usage. Harder garnet crystals (lower right) retain their sharp features. Note more distinctive crystalline structure, as against chalky appearance of silica sand.

Another Development At Ryan Aeronautical

PERHAPS the most penetrating and jarring of all factory noises are those produced by planishing departments in aircraft industries. Employment recruiting for this important phase of our defense effort is a serious problem because as yet no method has been discovered for "taming" these earth-shaking sounds and making them more pleasant to work with.

However, Ryan Aeronautical Company, San Diego, has practically eliminated manpower turnover in its planishing department by hiring deaf mutes for this specialized work. Both deaf mutes and company are happy about this practice because it has made these handicapped persons vital to our defense effort and has released other plant employees to jobs for which they are better suited.

Deaf mutes are among some of the longest employed at Ryan. Foremen and supervisors have become so accustomed to sign language that it is seldom necessary to write out instructions and communications.

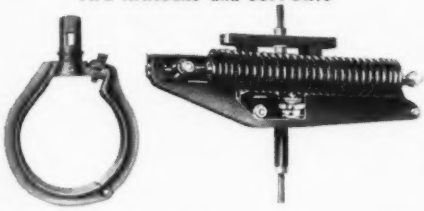
Thus, a new source of manpower has been opened to industry, and one group of our population has turned a handicap into a blessing, for it has made possible essential and secure jobs for them.

Bigger Water Heaters

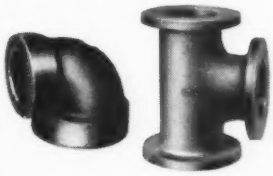
GAS heaters are getting bigger. Arizona Gas Company used to display 15-gallon size. Today they show 30 gallons and up. Portland Gas & Coke and San Diego Gas and Electric once had a 15-gallon limit. These and other gas companies are active in upgrading sizes. Reports from Southern California show that 20-gallon sizes are inadequate where automatic washing machines are used.

EVERYTHING FOR PIPING

PIPE HANGERS and SUPPORTS

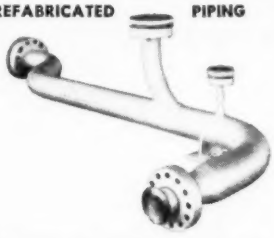


CAST IRON FITTINGS

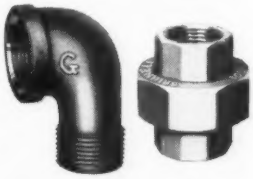


WELDING FITTINGS

PREFABRICATED PIPING

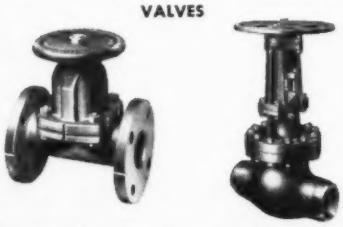


MALLEABLE IRON FITTINGS



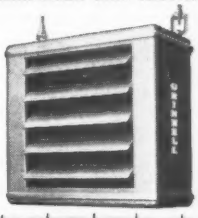
FORGED STEEL FLANGES

VALVES

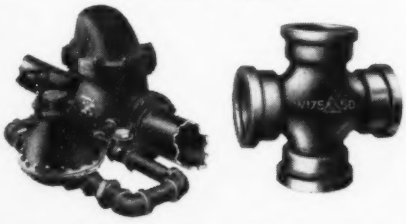


STEEL NIPPLES

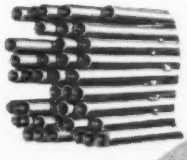
THERMOLIER UNIT HEATERS



WATER WORKS SPECIALTIES



PIPE



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Whatever your requirements for pipe, fittings, valves and other standard piping materials, you can get prompt delivery from a Grinnell warehouse or jobber. When the job calls for specialized piping products or installations, Grinnell has the manufacturing facilities, products, experience and engineering knowledge to "deliver the goods".

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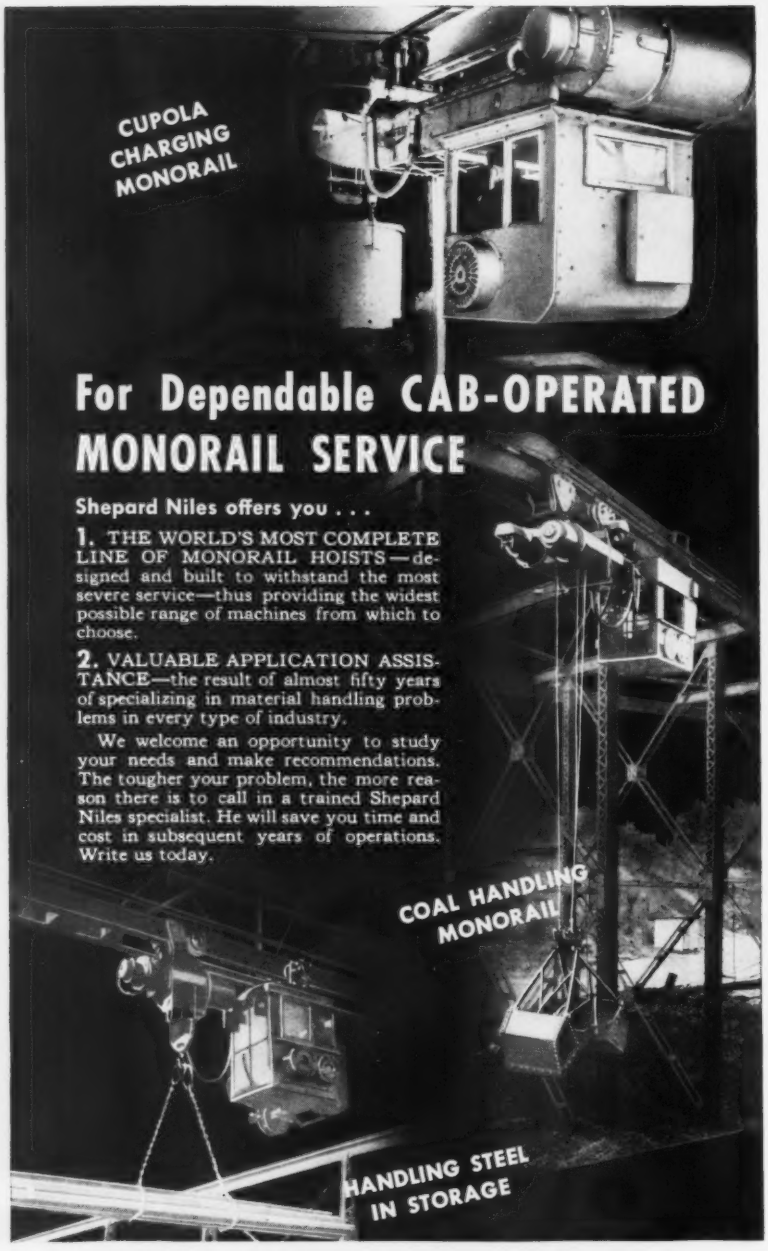
GRINNELL

WHENEVER PIPING IS INVOLVED

GRINNELL COMPANY OF THE PACIFIC. Branch warehouses: Fresno • Long Beach Los Angeles • Oakland • Pocatello • Sacramento • San Francisco • Seattle • Spokane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For Dependable CAB-OPERATED MONORAIL SERVICE
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1. THE WORLD'S MOST COMPLETE LINE OF MONORAIL HOISTS—designed and built to withstand the most severe service—thus providing the widest possible range of machines from which to choose.
2. VALUABLE APPLICATION ASSISTANCE—the result of almost fifty years of specializing in material handling problems in every type of industry.
We welcome an opportunity to study your needs and make recommendations. The tougher your problem, the more reason there is to call in a trained Shepard Niles specialist. He will save you time and cost in subsequent years of operations. Write us today.
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For WESTERN CUSTOMERS

For your greater convenience, we suggest that inquiries be directed to the Shephard Niles representative listed below, located nearest you.

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6238 Maywood Avenue, Bell, Los Angeles, California—Mr. Chester M. Mason

SAN FRANCISCO: STRYCO MANUFACTURING COMPANY
470 Natoma Street, San Francisco 3, California—Mr. R. C. Arquette

SEATTLE: PRESTON FALLER COMPANY
1921 Minor Avenue, Seattle 1, Washington—Mr. Preston Faller

What Puts Stretch In Our Rubber Supply

TAKING into consideration that 2½ tons of rubber go into construction of each B-36 bomber, 500 pounds are needed to keep a 5-ton Army truck rolling, 90 pounds are required to make a jeep, and 200 pounds are necessary for each bridge pontoon, it is not difficult to see why rubber industry expects to set an all-time record for production of man-made and crude rubber.

According to an estimate by B. F. Goodrich Company, the rubber industry expects to produce over 1,260,000 tons during this year.

Civilian uses continue to consume large quantities. Last year 600,000 tons went into automobile manufacture. In a normal year nearly 80,000,000 pounds are used for garden hose, and same amount for heels and toes of shoes. Fire hose takes 10,000,000 pounds; rubber bands, 4,000,000; erasers, 2,000,000; conveyor and elevator belting, 56,000,000 pounds, and rubber thread for such uses as girdles and golf balls, 10,000,000 pounds.

Each year industry produces enough rubber for 6,000,000 water bottles, 140,000,000 nipples and pacifiers, 1,200,000 ice bags and caps, 7,000,000 pairs of household rubber gloves, and 34,000,000 rubber baby pants.

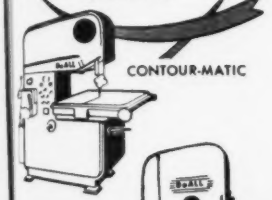
Ryerson Helps Customers Get Defense Work

A PLAN designed to help their customers who are seeking defense work has been announced by Joseph T. Ryerson & Son, Inc., steel distributors. For many years, the Ryerson company has published a pictorial type newspaper which is circulated nationally to firms in all lines of business. Now, for the first time, space will be made available in the next issue of this paper for insertion of classified advertisements for (1) prime contractors who have work to sub-let and are looking for shops that can handle it, and (2) shops that have open time and are looking for defense work on a sub-contract basis.

All customers have been invited to use the new classified advertising section in the next issue, without charge. Advertisements for prime contractors will briefly describe the work to be sub-let, size and shape of part, quantity needed, kind of material, delivery required, etc. Shops looking for subcontracts will state the kind of shop they have, kind of material handled, size limits, production capacity, facilities for tooling, number of employees, financial rating, etc.

DoALL

INDUSTRY'S NEW SET OF TOOLS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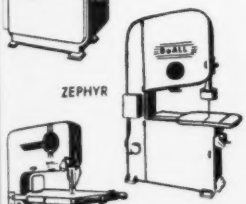
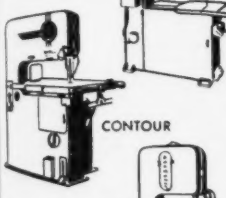
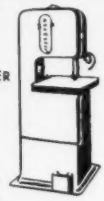
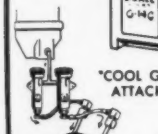

ZEPHYR

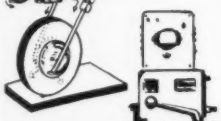

CONTOUR


BAND FILER

TOOLROOM GRINDER

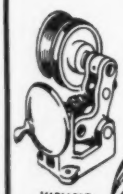
CRUSH GRINDER


"COOL GRINDING" ATTACHMENT


BLADE WELDER

GAGE BLOCKS

GAGE ACCESSORIES


VARIABLE SPEED DRIVES

SAW BANDS

An 8" x 14" Automotive Blanking Die made of hi-carbon, hi-chrome, air hardening tool steel at Advance Tool Stamping & Die Co., Columbus, Ohio. Shown here being sharpened.

DoALL COOL GRINDING
U. S. Patent 2470350
(Coolant-through-the-wheel)

NO DOWN TIME

6 MONTHS WITHOUT STOPPING

This DoALL Model G-10 Surface Grinder has been running day and night continuously for 6 months without any "down" time. A great many dies similar to the above are made and maintained in this modern shop. Machining on the DoALL is so smooth that polishing is not necessary.

Cool Grinding—Cools the Cut and the Work
A patented technique used with DoALL Grinders exclusively, produces more accurate finishes in much less time and cutting edges that last longer.

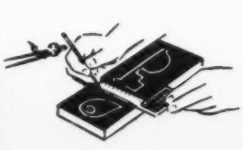
Full Visibility
You can see the work at all times. No messiness from old style coolants. Splash guards unnecessary.

Rigid as a Rock
Base and column support cast as one piece. DoALL Grinders are massive and rigid. Model G-10 weighs 3350 pounds.

Precision Plus
DoALLs are built extremely accurate as to flatness, parallelism, dimensional control and surface finish.

SEE ONE WORK. Call your local DoALL Store today. They'll arrange a demonstration—without obligation—of this revolutionary Surface Grinder and Cool Grinding.

"Cool Grinding" on the DoALL Super Precision Grinder (7 models available).


TOOL STEEL

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The DoALL Company
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DoALL Stores In Key Cities

Factory Trained Representatives Everywhere

Profitable Lignin Recovery Process

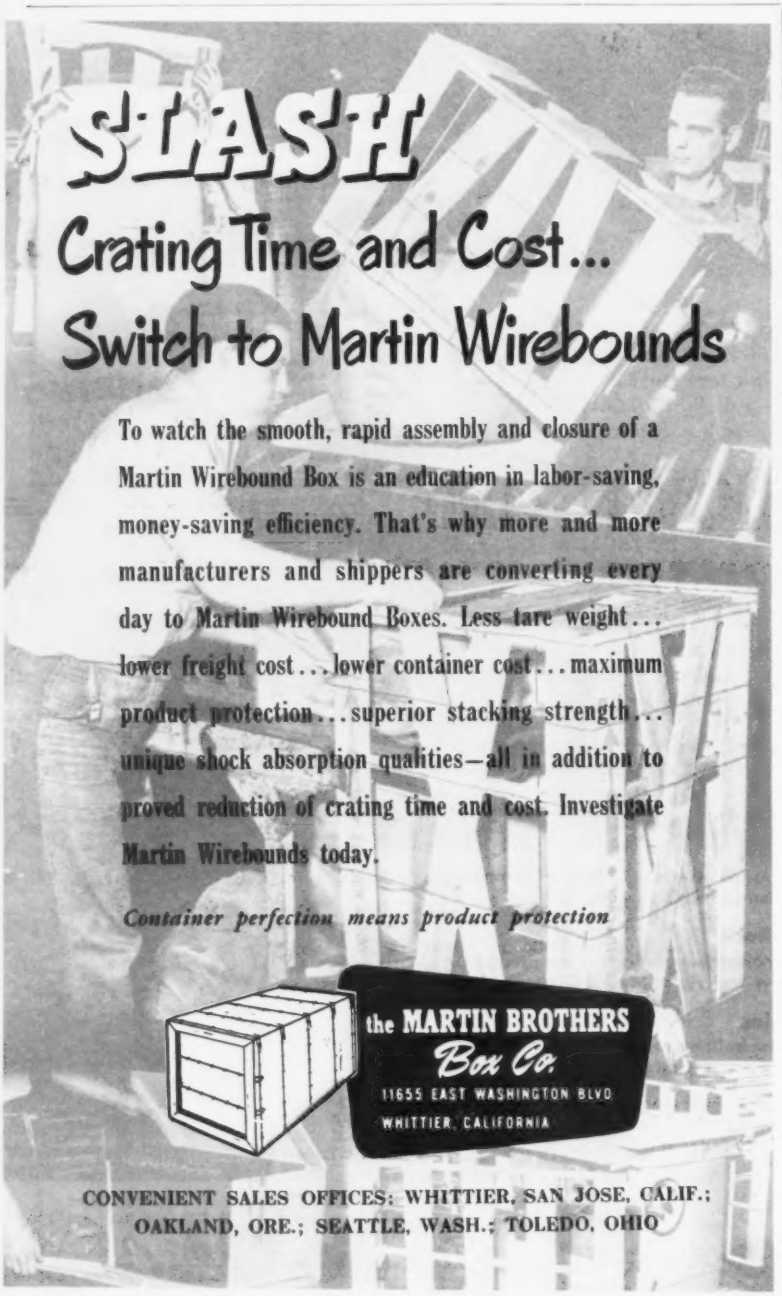
A NEW process which may double the value of wood pulp, because of the recovery of a lignin complex which has valuable adhesive qualities, can be used as a plastic and contains many of the components now obtained from coal tars, has been developed by Bror Grondal, professor of forestry at the University of Washington, and Piotr Zenczak, a research student.

Lignin complexes in the form of waste liquors are now being dumped, burned or partially regained at high cost, and also constitute a serious pollution problem in streams and rivers. The new method uses triethylene glycol as a solvent instead of the usual acid or alkali solution. Large-scale testing will be done by the Research Corporation of New York.

Measuring Tin Plate By Geiger Counters

FASTER, more accurate testing of tin plate coating thickness, without destroying or marring the plate, has resulted from the use of industrial X-rays and Geiger counters at the Pittsburg, Calif., mill of Columbia Steel Company. The gage measures within less than 6 ten-millionths of an inch.

Measurement of the tin coating is made by exposing a sheet of tin plate to an X-ray beam for a short interval and, at the same time, measuring with a Geiger counter the secondary rays reflected by the steel beneath the tin coating. The tin traps some of the secondary X-ray radiation. That which reaches the Geiger counter has been found to be in inverse proportion to the thickness of the tin coating.


SLASH
Crating Time and Cost...
Switch to Martin Wirebounds
To watch the smooth, rapid assembly and closure of a Martin Wirebound Box is an education in labor-saving, money-saving efficiency. That's why more and more manufacturers and shippers are converting every day to Martin Wirebound Boxes. Less tare weight... lower freight cost... lower container cost... maximum product protection... superior stacking strength... unique shock absorption qualities—all in addition to proved reduction of crating time and cost. Investigate Martin Wirebounds today.
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CONVENIENT SALES OFFICES: WHITTIER, SAN JOSE, CALIF.; OAKLAND, ORE.; SEATTLE, WASH.; TOLEDO, OHIO

Aircraft Employment Continues Upward

THERE ARE currently 165,972 persons employed in the aircraft manufacturing industry on the West Coast, a survey of the Aircraft Industries Association has disclosed, and total employment of more than 191,000 within six months is expected. At the start of Korean hostilities it was about 130,000.

The total Southern California aircraft employment roll is 136,935, of which 108,835 are in the Los Angeles County area alone. Boeing Airplant Company at Seattle, Wash., is the next largest area user, employing 26,037.

Using the U. S. Census Bureau's estimation that the average American family numbers 3.8 persons, there are currently 630,693 persons on this coast directly dependent upon aircraft wages, 413,573 in the Los Angeles area alone.

Largest Southern California employers are:

Douglas	29,908
North American	21,009
Lockheed	19,600
Consolidated Vultee	18,750
Northrop	10,082

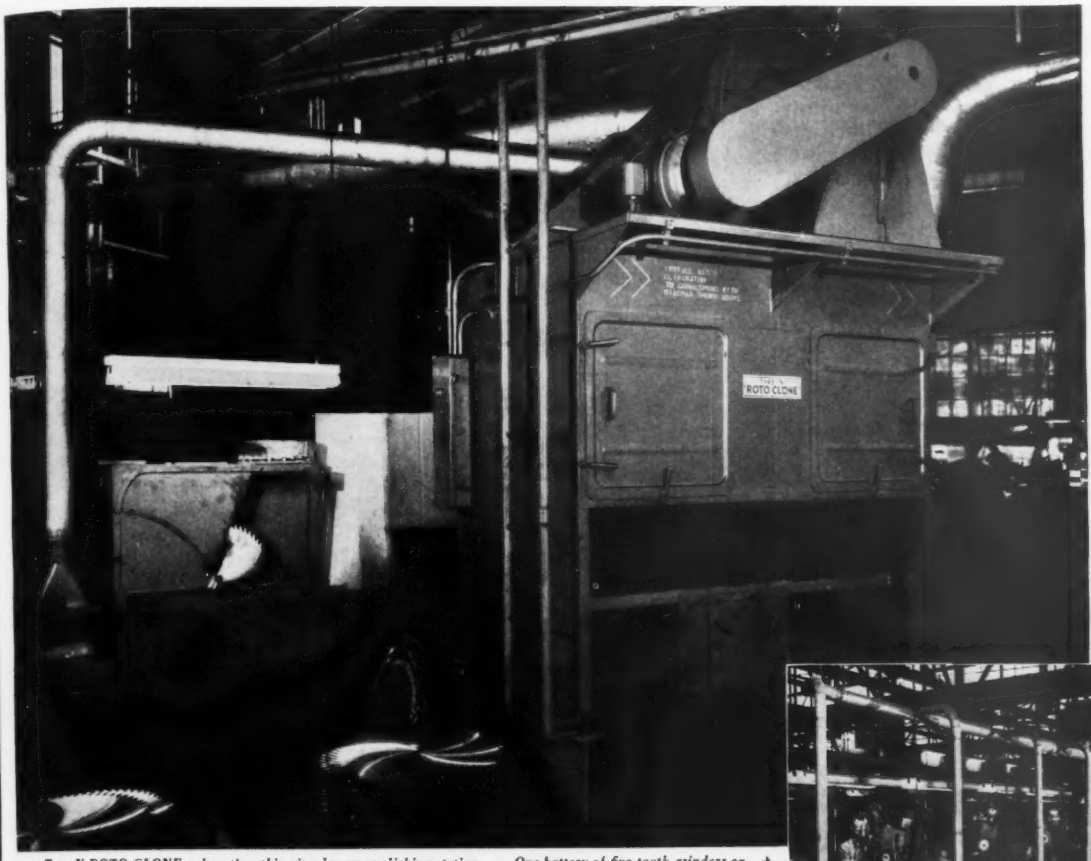
Aircraft wages paid on the West Coast in calendar year 1950 totaled $508,722,589, of which Los Angeles County workers received $327,438,805.

Eleven companies in Southern California alone currently are using 22,796 sub-contractors and suppliers. This number will be increased to 29,634 by year's end, it is estimated.

Safety Refresher

A WEEKLY refresher check-up on safety matters is held by Art Weleber, superintendent of the electrical department at the Weyerhaeuser pulp mill at Springfield, Oregon, with each of the 13 men in his department. This is one of the factors leading to a record of almost two years without a lost time accident in the department.

today's best buy is better air!



Type N ROTO-CLONE exhausting this circular saw polishing station and other dust sources at The E. C. Atkins & Co., Indianapolis.

One battery of five tooth-grinders exhausted by Type D ROTO-CLONE.

METAL DUST CONTROL
for millions of teeth!

ROTO-CLONE'S Flexible Unit System Solves Problems for Saw Manufacturer.

No dental clinic has seen as many teeth as they turn out at The E. C. Atkins & Co., Indianapolis. Grinding, polishing and cleaning millions of saw teeth create complex dust problems that are basically a part of all metal working industries, but in this instance . . . *are all under one roof.* AAF ROTO-CLONE* units in replacing a large, old-style central system now provide complete flexibility of dust control at each source, as well as many other advantages. For example: small Type D ROTO-CLONES with viscous after-cleaners allow recirculation of cleaned air from all polishing and dry grinding operations with consequent seasonal heat saving. Also, the Type D's permit rapid re-arrangement of machinery on production lines with their exhaust ventilation and dust collectors included as an integral part of the equipment.

Where fire is a hazard (as in polishing operations) for the dust sources that produce heavy loadings and fine particle sizes, the Type N ROTO-CLONE wet-collectors are used for their safety and high efficiency.

The complete line of ROTO-CLONES includes many types, sizes and arrangements that meet every metal working or finishing problem. For complete information call your nearby AAF representative or write for Engineering Bulletin No. 270.

**ROTO-CLONE is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Co., Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

American Air Filter
COMPANY, INC.
418 Central Ave., Louisville 8, Ky. • Pacific Division Office: 225 Bush Street, San Francisco, Calif.

Stephens-Adamson's Fiftieth Anniversary

STEPHENS-ADAMSON Manufacturing Company's 50th anniversary, which is being celebrated in the parent plant at Aurora, Illinois, is the thirty-first anniversary for the firm's Pacific Coast operations. In 1920 the firm opened a store in Los Angeles, built a plant in 1926 and subsequently established offices in San Francisco, Portland, Seattle and Salt Lake City.

Among S-A's outstanding contributions to the development of materials handling in the West has been the change-over in sugar handling from bags to bulk. This was an expedient necessitated in the last war because of the practical absence of jute sugar bags, but was found to be of great permanent value. When bulk sugar was lifted out of the ships' holds by bucket elevators and conveyed into the warehouse at Crockett, California, by a marine leg, and corresponding boat loading equipment was installed in the Hawaiian Islands, it was found that it so speeded up the turn-around of ships that they could pick up other cargo and leave more quickly at either end.

Most of the large cement plants on the Coast have been equipped by Stephens-Adamson with such materials handling equipment as belt conveyors and feeders for the handling not only of cement but also of raw materials used in cement manufacture. Many of the large gravel plants have been outfitted with aggregate handling and processing machinery.

S-A ore feeders also are used at the Kaiser steel mill at Fontana and at the mines which supply the mill. General Mills in Los Angeles have a large installation of S-A conveyors, mostly of the Redler-Conveyor type. They also use an S-A box car unloader for grain.

Many of the chemical plants up and down the Coast, such as, for example, Stauffer and Philadelphia Quartz, have S-A equipment. Owens-Illinois in Oakland and Los Angeles are S-A equipped for materials handling, and the mail in Los Angeles is handled to and from railway mail cars in S-A conveyors.

The Amsco manganese steel feeder was first marketed by S-A in 1924 and has since been installed in almost 90 per cent of all Western metal mines. A large ore processing plant had almost 50 of these heavy duty units in operation by 1929, and to date there is no record of any Amsco feeder wearing out, or being seriously damaged while in operation.

Long aware of the importance of good bearings in improving conveyor performance, S-A began producing its own bearings in 1938. The Sealmaster ball bearing unit is now produced in a modern plant completed in 1946 and is used not only on all S-A machinery, but distributed throughout the world.

The Zipper conveyor was introduced in 1944 and offers extreme layout flexibility, along with gentle handling. This rubber belt forms an endless tube when closed, and carries material vertically and on inclines, as well as the horizontal.

Wide Range for Automatic Submerged Arc Welding

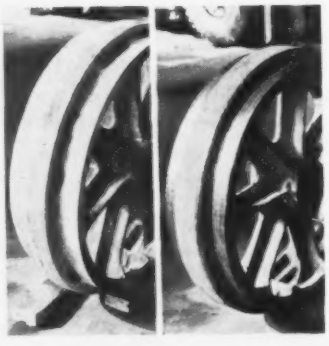
NOW THAT CONSERVATION has entered the picture again, automatic welding machines have entered the fields of repair and reconditioning. Simplified controls and elimination of costly fixtures have reduced the price to the point where many Western firms—dealers as well as distributors—can profitably afford the investment.

For example, problems concerning the conservation of track rollers and idlers on Caterpillar equipment are now solved by the installation of an automatic submerged arc welding machine in dealer and distributor shops.

For a number of years, manufacturers alone have been using the submerged process in the fabrication of structural members. Essentially the same as the more familiar arc welding accomplished by hand, the submerged arc process uses bare (uncoated) wire electrodes producing an arc with the base metal under a protective coating of molten flux. In either instance the molten metal is protected from the atmosphere.

Many Caterpillar dealers use this machine manufactured by The Leader Welding and Manufacturing Co., Berkeley. Note roller and idler positioning. Sample rollers below.

Badly worn tractor idler, showing holes in the rim (at left), while at the right is same idler after holes were filled with weld patch on inside and then placed on the automatic welder for weld overlays.



Accomplishments of automatic welding machines are unlimited. Worn track rollers, idlers, carrier rollers, wear plates, cutting edges, bits, etc., can be very successfully restored to size in record time and with surprisingly low cost.

Submerged arc welding is extremely fast: 20 inches of weld per minute can easily be accomplished. Because the welding head controls the arc voltage, current and rate of electrode feed, welds are very uniform in width and depth of penetration as well as very smooth in appearance.

Caltech Conference

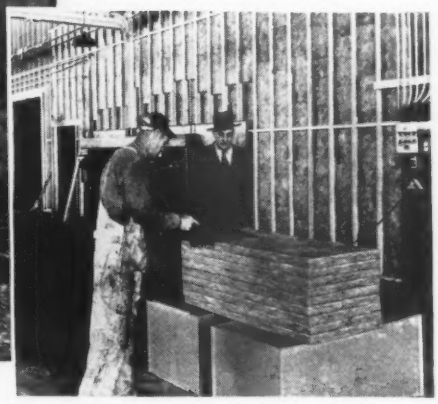
THE FOURTH SERIES of summer management and personnel conferences of the California Institute of Technology at Pasadena will be held at Caltech June 17-29. Conference leaders will be: *Robert D. Gray,* director of the Caltech industrial relations section; his assistant, *Ramon A. Nelson; Thomas G. Spates,* professor of personnel administration at Yale University; *Dr. Robert K. Burns,* executive officer of the industrial relations center at the University of Chicago; *Dr. Russell L. Moberly,* director of industrial management institutes at the University of Wisconsin; *Dr. Rensis Likert,* director of the institute for social research at the University of Michigan; and *H. L. Samuelson,* manager of executive development for the Standard Oil Company of California.

LEFT:

Port of Tacoma Cold Storage Plant —535,000 bd. ft. of Fiberglas AE (Asphalt Enclosed) Board Insulation.

BELOW:

Calavo Growers Pre-Cooling Plant, Escondido, Calif. Fiberglas PF (Preformed) Insulation on walls and ceiling.



Low Temperatures... AT LOW COSTS!

FIBERGLAS* LOW TEMPERATURE INSULATIONS have exceptionally low thermal conductivity and possess life-of-the-building permanency. Their use means dollars in your pocket—dollars saved in material, application and maintenance costs—as well as in cost of power required to maintain chilling, holding or processing rooms at low temperatures.

Asphalt adhered **Type-AE (Asphalt Enclosed) Board**—and mechanically applied **Type-PF (Preformed) Insulation** have a proved record of unsurpassed service for efficient insulation of walls, partitions and ceilings in low temperature structures.

Ideal for the Job—highly moisture resistant Fiberglas Insulations behave better under possible dampness—won't spall or disintegrate if inner wall frost develops. They will neither produce nor pick up odors in service. The ageless fibers of glass cannot rot, decay, support mold or fungus growth, and will not provide sustenance for vermin or rodents.

Installation Costs Are Low—Fiberglas Low Temperature Insulations are light in weight, structurally sound, easy to cut and apply by standard erection practices. Competent Fiberglas applicators do first rate engineering and application on all types of jobs.

For name of your local applicator and a copy of the informative data book, "Insulation of Low Temperature Structures", phone the FIBERGLAS branch nearest you OR write to OWENS-CORNING FIBERGLAS CORPORATION, Box 89, Santa Clara, California.

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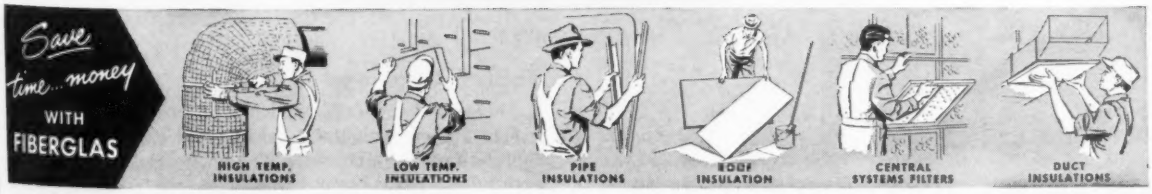


*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of the Owens-Corning Fiberglas Corporation for a variety of products made of or with fibers of glass.

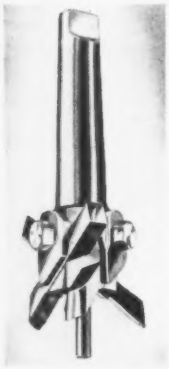
NEW MATERIALS & EQUIPMENT

FOR YOUR CONVENIENCE . . .
Use postage-paid card following page 84 to obtain further information on products described on these pages and literature listed on following pages . . .

E-601

Hole Cutting Simplified

Features claimed: Cutting accurate, finished holes on steel pipe, stainless steel, boiler plate, hard fibre, or Transite in a single operation is now possible with a new 3-blade adjustable hole cutter. This is an engineered tool with replaceable cutter blades that are easy to sharpen and set. Body of hole cutter is made of specially selected heat-treated steel with three high-speed steel blades set 120 deg. apart. Pilots are removable to permit use of lead drills. Instrument has cutting range of ⅝-in. to 5-in. diameters and thickness capacities from thin sheets to one inch.



Available from: Robert H. Clark Company.

E-602

Combination Hardening and Tempering Furnace

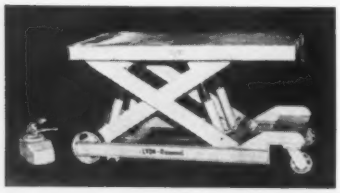
Features claimed: This No. 869 hardening and tempering furnace is designed to give operator automatic control of temperatures ranging from 300 to 2,200 deg. F. Since temperature is controllable, furnace can also be used for tempering. Furnace is 8 in. wide, 6 in. high and 9 in. deep with maximum current consumption of 4 kw. It is wired for 220-volt single phase operation, and has easy-to-operate counterweighted door which rides in a wedge slide to seal door in closed position. Heating elements are made of non-scaling, non-flaking, high temperature coiled wire. All contacts are enclosed and furnace is shipped ready for operation.

Available from: K. H. Huppert Co.

E-603

Scissors Type Feeding Table

Features claimed: For handling bundles of square or nearly square steel sheets, where load is concentrated in a relatively small area and height of bundle is greater than for large sheets, a new sheet feeding table of short overall length with a maximum range of elevation has been designed. Overall length of top is 66 in., but table elevates from 18 to 36 in. Hydraulic rams working against the lifting levers raise table. Power is supplied by either foot-operated hydraulic pump or a motor-driven hydraulic pumping unit which is available with either push button or pedal type controls.

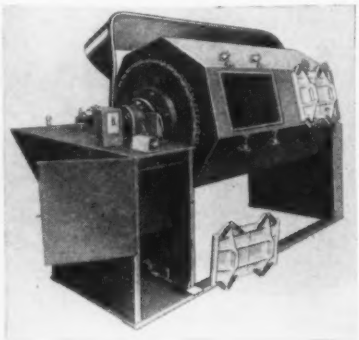


Available from: Lyon-Raymond Corporation.

E-604

Tumbling Barrels

Features claimed: Made in both constant and variable speeds, this new "Marco" tumbling barrel has motor and operating mechanism totally enclosed. Only exposed parts are controls and magnetic reversing starter, making it completely safe in operation. A limit switch permits operation only when hood is closed. This 7½-hp. model has speeds from 8 to 25 rpm., and speed changes may be made while barrel is in motion. A foot-operated hydraulic brake at floor level stops barrel in any position, facilitates loading and unloading and prevents accidental dumping of loads. Also manufactured in 5- and 3-hp. models.



Available from: D. J. Murray Manufacturing Co.

E-605

For Easy Silver Plating

Features claimed: With only a sharp steel wire brush or abrasive cloth, a clean rag, water, and a pound of this plating powder, you can silver plate approximately 6,000 sq. in. This method of silver plating high amperage electrical connections is especially desirable for improving continuity of electrical service and reducing maintenance times and costs. It is a solution to problems of heating due to oxidation. Cool-Amp silver plating powder deposits a genuine coat of silver which will not peel off and which gives cool maximum conductivity for copper, bronze or brass contacts. It is completely harmless to user and is simple to apply.

Available from: The Cool-Amp Company.

E-606

Vacuum Calculator

Features claimed: Now available for free distribution is Stokes vacuum calculator, a slide rule designed for quick calculation in vacuum research and processing work. It will determine needed pump capacity to evacuate a given volume to a specified vacuum in a given time, and time re-

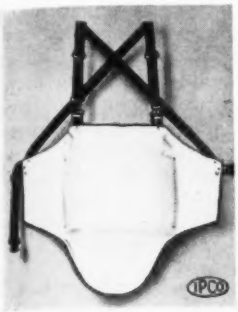
quired to reach a specified vacuum in a given volume with pump whose capacity is known. It will also determine vapor pressures of water at various temperatures and capacities of round tanks in both cubic feet and gallons per foot.

Available from: F. J. Stokes Machine Company.

E-607

"Kick-back" Apron

Features claimed: This apron is designed to protect power saw machine operators from injury to their bodies by forcible ejection of lumber. It is constructed with a heavy fibre shield on inside, bound and strapped in a convex position to cover abdomen. Back of apron is padded with hair felt for comfort and additional force resistance. Padding is tufted to hold it securely in place. Outside covering is of heavy white canvas. Sturdy web shoulder and waist straps are adjustable to wearer.

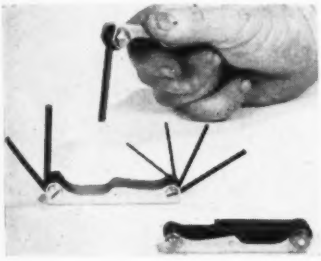


Available from: Industrial Products Company.

E-608

"Smitty Jr."

Features claimed: This tool which fits the smaller size, standard socket head screws and bolts, has six individual socket wrenches, sizes .050, 1/16, 5/64, 3/32, 1/8 and 5/32 inches, that fold knife-like into a single handle. This pocket-sized handle is constructed so as to permit greater leverage at every angle. Greater leverage necessitates making wrenches of a high quality, tempered steel that have longer than ordinary life.

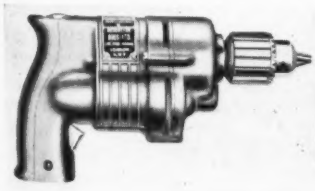


Available from: H. D. Hunter Company.

E-609

Portable Electric Drill Gun

Features claimed: Especially designed to meet special requirements of plant managers, foremen and men on production lines charged with drilling high tensile steel, brick and glass, is this Desoutter portable electric drill gun, DG 45. It is geared down to 450 rpm., and has a capacity of 5/16 in. in steel and ⅝ in. in wood, yet weighs only 3 lb. Light weight is accomplished through special design features which enable a full-sized, high-output motor to be accommodated in a relatively small space. High strength, light weight silicon alloy pressure die castings are used throughout. Helical gears are made from nickel-chrome molybdenum steel, heat treated. Ball bearings are used exclusively. Motor features a flat



OLD and obsolete machines, like ancient warriors, belong to a bygone day. Good in their time, these machines of the past hamper production, increase costs, help your competitor..

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Our blower motor needs repair."

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For repair work of all kinds—motors, engines, electrical appliances, watches—turn first to Classified. When you need any product or service, find it fast in the Yellow Pages, your handy *local* buyer's guide. Just as other buyers will find you fast when you advertise in Classified.

You'll find it fast in the

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Pacific Telephone

horseshoe field with windings in one top coil, making possible a full-sized armature in a small overall diameter. This gun has a natural squeeze-action switch which is lockable for continuous running.

Available from: Newage International, Inc.

E-610

Diesel Powered Fork Truck

Features claimed: This new industrial fork truck is powered by a diesel engine and a fluid transmission, and is the first diesel-powered unit commercially available. It is especially designed for use where fire hazards exist, where there is a limited amount of fresh air, and in outdoor areas where continuous heavy-duty operation is a necessity.

Available from: Yale & Towne Mfg. Co.

E-611

Concrete Cutting Saw

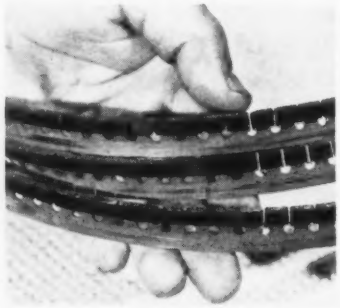
Features claimed: Equipped with a gasoline motor, so as not to be dependent on any outside source of power, this "Creeper" Concrete Cutting Saw makes cutting smooth, straight edges a one-man operation. "Creeper" has guide rails which facilitate making edges smooth and straight and simplify the moving of this unit from job to job. A water hose attachment is available for use with diamond abrasive blades where dust suppression is required.

Available from: Martin Fireproofing Corp.

E-612

Hardened Steel Machining Tool

Features claimed: This line grind band on a contourmatic band machine is a cutting tool and machine combination that will do precision vertical grinding on inside, outside and contour cuts in hardened metals. Band tool is a tough alloy band on which cubical molded abrasive matrices are welded. In its cutting action there is an equalized balance between bonding and abrasive grits which gives a constant degree of abrasive exposure. It is made in two types—one aluminum oxide and one silicon carbide—and in two sizes, which give a complete selection for cutting and grinding many different types of hardened materials.



Available from: DoAll Company.

E-613

Flat-bed Rear Drive Truck Carrier

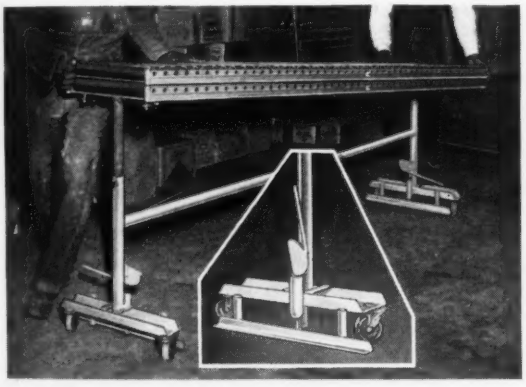
Features claimed: A one-ton truck model, having standard automotive drive, with Ross steering assembly and Borg-Warner transmission and clutch, is now available. All speeds are controlled by one gear shift lever. Driver sits in elevated rear seat facing load. In steering, front wheels turn as in passenger cars to effect readier and safer turns. Turning radius is 8 ft. It is a compact unit with low 20" bed, 4 ft. wide, 5½ ft. bed length. Weight is 964 lbs. Brakes are hydraulic two-wheel; tires 5.00 x 8, 4-ply. Drawbar capacity allows for pull of 400 to 600 lbs. Speeds are 20 mph., high; 12 mph., second; 6.4 mph., low or reverse.

Available from: Gar-Bro Manufacturing Co.

E-614

Polishing with Diamonds

Features claimed: A new diamond abrasive compound prepared especially for sizing and polishing carbide wire drawing and heading dies, DYMO-C, cuts up to 20% faster than diamond-olive oil mixtures when applied to carbide. It is delivered ready for use; no mixing is required. Other advantages are proper viscosity for convenient application, resistance to slinging, an inherent property of working down lapping stick or pin to actual work area, convenience



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Save Money on Your Handling Jobs

Standard 5′ and 10′ sections and 45° and 90° curves on portable tripod stands or portable section stands (as illustrated) with or without "Pelican" Floor Lock.

Ideal for warehousing, loading and production line use. Easy to handle and move.

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Belt type Horizontal and Floor-to-Floor "Power Helpers"

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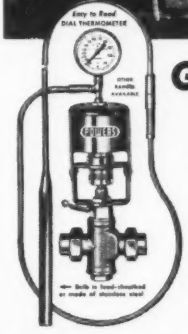
In PLATING, CLEANING and RINSE TANKS, ANODIZING, OXIDIZING, PICKLING and DEGREASING TANKS

Below:
Official U. S. Navy Photograph
Michelson Laboratory
Naval Ordnance Test Station
Inyokern, Cal.

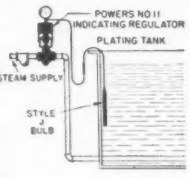


Get BETTER Control
SAVE LABOR
Reduce Costs with—

POWERS

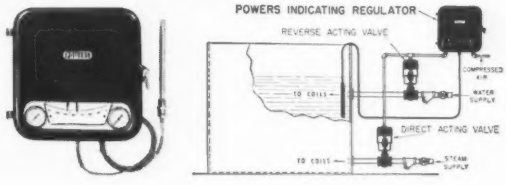
No. 11 TEMPERATURE REGULATORS

Most of the more than 30 steam heated tanks used in the Navy's modern shops shown above are automatically controlled by Powers regulators. They maintain a constant temperature, end losses caused by OVER-heating, help reduce rough plating, buffing time and decomposition of plating solutions.



Easy to Install—self-operating, have an easy to read 4" dial thermometer which shows temperature of plating solution under control. They are available with either lead sheathed or stainless steel bulbs. Bulletin 329 gives full information.

Compressed Air Operated Indicating Regulator



POWERS Series 100 Regulator

Accurately Controls heating and cooling of plating solutions

Powers has the most complete line of temperature regulators made **for metal finishing operations. Contact our nearest office for further information, or**

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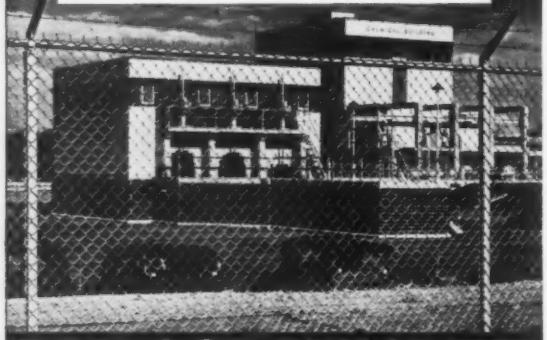
- All fittings, hinges and locking devices have bolts *on the inside,* secure from tampering.
- Heavily galvanized by a special process, Realock Fence is weather-resistant, extra strong and durable...costs little or nothing for maintenance.

For complete details refer to Sweet's Catalog. For free estimate consult your classified telephone directory—or write direct.



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THE CALIFORNIA WIRE CLOTH CORP. 1080 - 19th Avenue, Oakland 6, California
BRANCHES & DISTRIBUTORS IN KEY CITIES EVERYWHERE

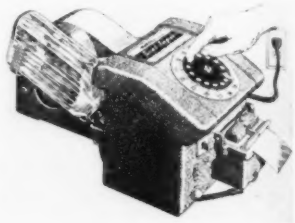
of application, resistance to drying out, deterioration or settling.

Available from: Industrial Products Division, Elgin National Watch Co.

E-515

Tailored Tapes

Features claimed: Dial-Taper is an entirely new kind of gummed tape machine with telephone type of dial that displaces manual with automatic operation. Operator simply selects on dial the length of tape needed and a twirl of dial starts and stops machine automatically as it dispenses any desired length of tape.



Available from: Marsh Stencil Machine Co.

E-616

High Gloss Floor Finish That Wears Well

Features claimed: Westwax is a high gloss floor finish that provides exceptional resistance to traffic wear, while Kwykwax is recommended for use when high gloss properties must be sacrificed to anti-skid qualities, because it contains less carnauba wax. Water soluble Westwax dries in 20 minutes, leaving a high gloss without buffing or polishing. Kwykwax, also a water-emulsion wax, helps bring out original color of floor surfaces, is durable and water-resistant.

Available from: West Disinfecting Company.

GAS

SERVES WESTERN INDUSTRY BEST

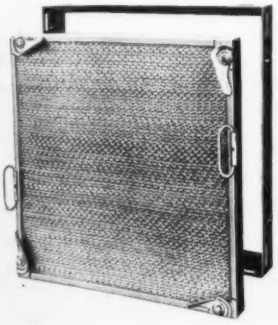
Can advanced methods of Controlled Heat reduce costs in your plant? Your Gas Company's Industrial Engineering Consultant is equipped to help you find out. Telephone your Gas Company.

PACIFIC COAST GAS ASSOCIATION

E-617

High Velocity Unit Air Filter

Features claimed: This new unit air filter is made of corrugated strips of fine mesh wire in which the corrugations taper so when two strips are placed together they form a series of pyramid shaped pockets. The small ends of the pockets are closed to the air flow to eliminate any open air passages through the media. The filters are designed to operate at velocities up to 500 fpm. and maintain a uniformly high cleaning efficiency over a wide range of air velocities. They can be serviced in the conventional way with washing and charging tanks.

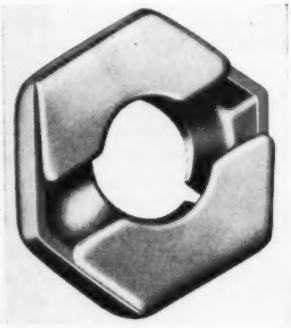


Available from: American Air Filter Company.

E-618

Double Lock Nut

Features claimed: This one-piece double action spring lock nut provides 360-deg. grip into root of screw. It is the only sheet metal nut with a double lock; has twice the tensile strength of ordinary spring nuts; and is 70% lighter in weight than conventional lock nuts. Made of SAE-1060 steel in thicknesses of .016 and .020, this Hex Lox nut is produced in five sizes for machine screws: 6-32, 8-32, 10-32, 10-24, and ¼-20. Wright Field tests showed this nut as having highest installation, prevailing and back-off torques.

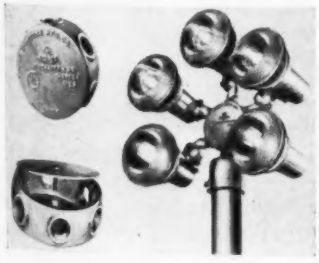


Available from: Prestole Corporation.

E-619

All-Weather Protective Lighting

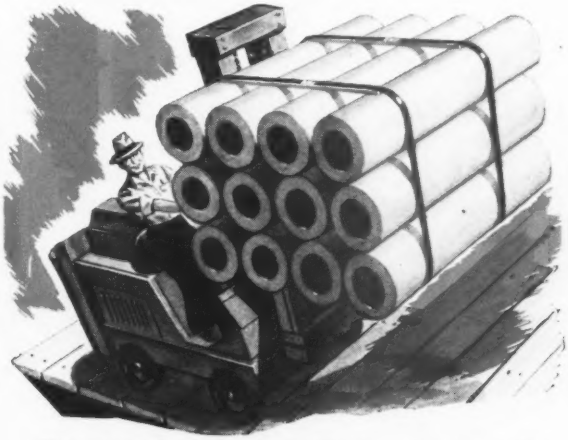
Features claimed: Factory yard lighting, boundary fence lighting and other industrial area floodlight needs are easily handled by these weatherproof cluster lights. The new units are made of tough aluminum alloys, precision die-cast under tremendous pressure for structural strength. A removable cast aluminum cover plate sealed with a heavy cork gasket provides quick access to inside wiring. Each box has six holes tapped ½-in. IPS to take from one to five standard lampholders for the 150-watt, 200-watt and 300-watt outdoor weatherproof reflector bulbs.



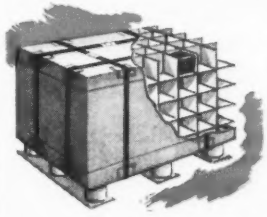
Available from: Stone Manufacturing Company.

it's a fact

IN UNITY THERE'S STRENGTH, ECONOMY AND PROFIT!



Take electrodes, for example. They're expensive, easily damaged. Handled singly, many hours are consumed in readying a carload for shipment. Strapped 12 to a pallet as shown, they can be quickly handled by a fork lift truck at a fraction of the cost and damage risk.



This steel strapped expendable pallet is another modern way to handle fragile products—in this instance, electronic sub-assemblies. 175 pieces are here combined into one unit load.

Even compressible cartons of clothing, strapped together in multiple units on a pallet, may be stowed in freight cars or warehouses in far less space, and time, than is necessary with most other methods.

it's a fact to remember

Almost every day, to Signode's Field Engineering headquarters, come products of varying shapes and sizes in containers that are either too heavy and expensive, or inadequate for the job they should do. Often, improvements can be achieved through the proper use of steel strapping. There may be an idea here for you . . . today, if you're in *essential work,* or *tomorrow,* when competition again calls the play.

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ACCURATE OPERATING PRESSURES—Setting holds over entire pressure range, regardless of inlet drop, thus keeps welding or cutting flame steady without readjusting—so you increase working time and save gas.

MORE WORK WITHOUT REPAIR—Seat mechanism is designed to close *with* flow, thus eliminating impact friction and wear. Diaphragm is made flat of nickel-silver alloy; patented rubber cushion protects against shearing. Improved filter protects seat and nozzle from scale, rust and dust.

SAFETY FEATURES—*Oversize* equalizing chamber removes compression heat hazard. Relief valve operates instantly in case of excessive pressure.

Why waste time and gas with worn-out regulators? Accurate, long-wearing VICTOR Safety Regulators are available for almost every use and gas; for pressures up to and beyond 5,000 PSI; for volumes up to 2,000 CFM. Ask your VICTOR dealer to show you. Call him NOW.

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E-620

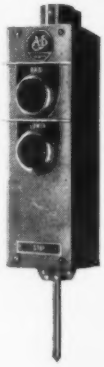
Specially Designed Hollow Mills

Features claimed: Designed and manufactured to meet specific requirements are these small hollow mills of extreme precision, having an O.D. of 5/8 in. and under. Machined of carbon, high-speed steels or special steel alloys, W-S hollow mills may be plain or adjustable, with internal or external steps for left and right hand screw machine work. They are heat treated for long life and precision made to required tolerances.

Available from: Woodruff & Stokes Co., Inc.

E-621

Push Button Control



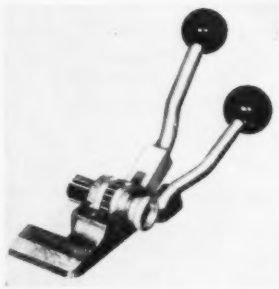
Features claimed: This new pendant push button station is a new oil-tight control station designed for use as a portable control or suspension above a machine within easy reach of operator. These stations are obtainable in sizes having three to ten units, including stop. Standard stop unit is a wobble stick in bottom of enclosure, but can also be furnished as a mushroom head mounted in bottom or front of enclosures. Each enclosure has a cable anchor at top.

Available from: Allen-Bradley Company.

E-622

Steelbinder

Features claimed: A new tool, known as No. 120 Steelbinder, is designed for pulling steel strapping of 3/8, 1/2, 5/8 or 3/4 inches tight around any size or shape object. It operates like large steelbinder tools except that it does not cut off surplus strap as an integral part of its binding action. Shortened handles adapt it to close-quarter work, as on ladders, scaffolding, etc. This pocket-sized tool achieves its "tighter tie" because it places no wedge between strap and object tied. Low price of tool makes it a practical home shop tool as well as an effective instrument for industrial shipping, storage and maintenance strapping.



Available from: A. H. Gerrard & Co.

E-623

Milling Machine Cutter Arbors

Features claimed: A new type of collar makes it possible to space all milling machine cutters within one-quarter of .001" by the visual graduating means engraved on outer micrometer sleeve. This precision spacing of collars is made by loosening milling machine cutter arbor nut after first trial cut is made. Adjustment is made by directional plus or minus indicator, using a furnished spanner wrench. After milling machine arbor nut is tightened, collars are so designed that there is no slipping and positive adjustment is assured throughout production run. These spacing collars

are made of a special alloy steel that will take an arbor nut pressure up to and including 25 tons.

Available from: Dayton Robers Manufacturing Co.

E-624

New Tachometer for Wide Speed Ranges

Features claimed: Especially useful when a wide range of speed measurement is desired is this new three range, single head, fixed installation tachometer indicator. Simple rotation of indicator range knob instantly selects one of three speed ranges to measure any speed over a total range of 40 or 50 to 1, based on readings down to 1/10 full scale of lowest range. Ranges are carefully chosen for ease in reading, and scales are all 4 inches long with 100 divisions. Indicator calibration is stable indefinitely and good over a wide temperature range. Scales are supplied for direct reading in any units such as rpm., fpm., inches/seconds, or in any quantity which is proportional to speed actuating in head.

Available from: Metron Instrument Company.

E-625

Wires Getting Smaller All the Time

Features claimed: A new degree of miniaturization made possible by tensulation, produces wires so small that 350 of them pass through half a paper clip. Each wire consists of 4 strands of No. 40 copper wire so that 1,400 strands occupy an area of ¼ x ⅝ in. Tensulation process features use of thermo plastic, thermo elastic and other film material in tape form applied parallel to conductor after film has been heated to precise temperature required for complete lamination and coalescense. It is then instantly wrapped and drawn in layers until desired wall thickness is obtained. Conductors, cabled or singly, may then be covered with metal or fabric

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braid. Although no dies are used, insulation wall is uniform, free from pinholes, lightweight and small in size.

Available from: Tensolite Insulated Wire Co., Inc.

E-626

Fractional Hp Manual Starter

Features claimed: A new class 2510 Type A fractional horsepower manual starter is designed to control and protect single phase AC and DC motors of 1 hp. and less. Both single and double-pole devices are available. Double-break contact mechanism has quick make and break action and contact tips are of fine silver. Starter incorporates trip-free overload protection which gives a definite trip indication. Interchangeable overload relay units are accessible from front. Line and load terminal are arranged for straight-through wiring.

Available from: Square D Company.

E-627

Three New 15" Bandsaw Models

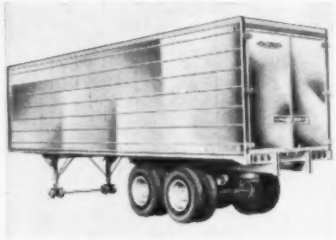
Features claimed: Speeds ranging from 80 to 5,000 fpm. are offered in these new units. There are no belts to change and no gears to shift. A speed indicator is located at eye level so that the operator can tell at a glance blade speed of the unit so adjustments can be made accurately. For use with conventional flat blade guides of hard cast bronze provide rigid alignment of the blade. Guide blocks are adjustable fore and aft as well as sideways. The entire upper band wheel assembly of the unit is mounted on a rigid steel tube and is adjustable vertically 4" to provide an 8" blade take-up. The bandsaw is mounted on an integrally cast base for utmost strength and rigidity.

Available from: Tyler Manufacturing Co., Inc.

E-628

New Stronger, Lighter Truck Trailer

Features claimed: Newly developed Model A truck trailer embodies many improvements and innovations such as, Alclad panels which resist corrosion and remain bright, roof-bows with greater resistance to deflection, roof sheets ribbed for greater strength, die-formed steel bumpers and steel tail-shelf for rear end protection, lighter, stronger floors, dent-resisting roof members, extruded aluminum door-frames, and close-fitting hinge butts on door hinges which are protected by bumpers.



Available from: The Trailmobile Company.

Continued on page 82

Straw Pulping Plant For Colorado Proposed

PAPER SHORTAGES and high cost of paper have worried American industry since the beginning of the last war when there began the great drain on pulpwood supplies. Industrial uses for farm residue have long been sought by farmers and industrialists of the West. To these seemingly unconnected problems, one solution is now suggested.

European, Oriental and Latin American nations have produced fine papers from straw for some years. The United States, which allows approximately 70% of all available wheat straw to lie fallow or be burned, has used wood pulp in its paper industry because there was an abundant supply available at low cost. The war and its drain on natural resources has altered this situation.

U. S. Department of Agriculture at its Northern Laboratories in Peoria, Ill., has been conducting research and scientific experiments on use of wheat straw for pulp for several years. Results reveal that a suitable straw pulp can be manufactured which, when blended with woodpulp, makes possible production of paper with properties superior to that made by either raw material alone.

Forward looking citizens of wheat-growing states now visualize important new industries based on the conversion of straw into marketable paper products. Colorado has taken the lead in this project. The Colorado Development Council has surveyed possibilities of this new industry for their state.

Taking into consideration locational factors which would govern location of a straw pulping plant, the South Platte River Valley in northeastern Colorado and the lower Arkansas Valley below Pueblo are logically situated. Council also advises that the new pulping process developed by Northern Laboratories, the Kraft or Soda Mechano-Chemical process, would be the more practical method in Colorado since it avoids stream pollution.

In the Kraft or Soda Mechano-Chemical process, pulping is done at atmospheric pressure in a device known as a hydropulper. This device is loaded with straw which, in turn, falls against a vane-studded rotor. Straw is thus thrown vigorously against the sides of the pulper, as well as being subjected to the action of steam and hot cooking liquors. In the Kraft process, more than 6% sodium hydroxide and 3% sodium sulphide are used, while the Soda process utilizes 10% sodium hydroxide. About 10% chlorine is then used to bleach the pulp.

With straw at $7.00 a ton, one ton of pulp would cost $59.37 by this method. Market price of hardwood pulps is at least $125.00 a ton, and softwood pulp prices are higher. It seems obvious that, even after adding enough to costs for a fair return on investment, a flourishing straw pulp industry could help reduce paper costs in the United States. It could also supply new industry to Western states, as well as bring profit to the farmer in disposing of what is now farm residue.

Graphite the Bearings

A SUGGESTION that graphited bearings replace greased bearings, which would not stand the heat, in the pivots of small ladles dried in the ovens for the centrifugal foundry won a $288 award for Ed Gallagher at Electric Steel Foundry Co., in Portland. As a result, the maintenance department does not have to spend three or four hours a day removing handles, collar and bearings because of heat melting the grease from the bearings. The award was made on a basis of the savings made.

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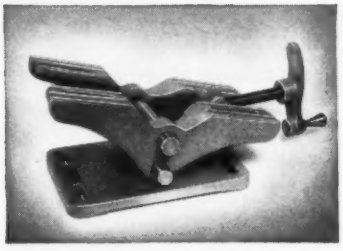

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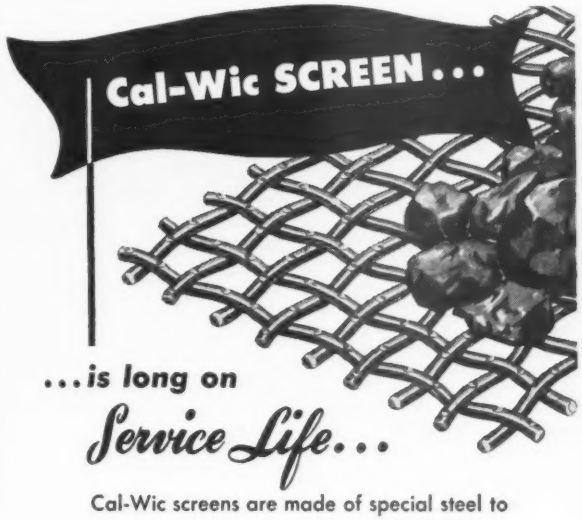

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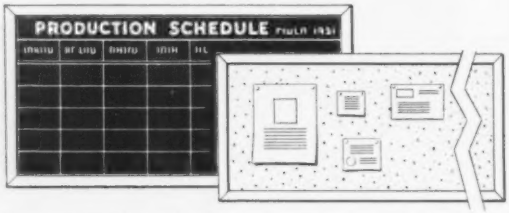

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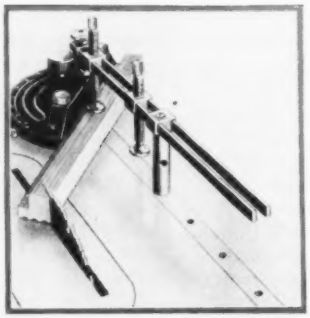
E-629

Miter Gage Clamp Attachment

Features claimed: Now available is clamp attachment No. 865 for standard Delta miter gage. This device is especially valuable when making accurate miter cuts and cutting irregular stock. It consists of a bracket and two clamps which hold work firmly in position. It can be attached to any standard Delta miter gage, 8 and 10-in. Delta saws, band saws, spindle shaper and abrasive finishing machines.

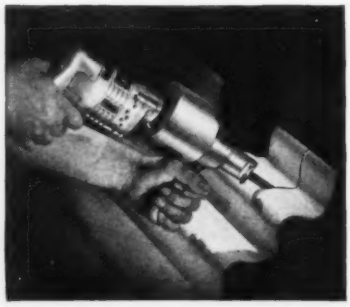


Available from: Delta Power Tool Division, Rockwell Mfg. Co.

E-630

Portable File and Saw

Features claimed: E-Z saw is a portable, precision engineered, heavy duty unit that attaches directly to electric or air drills, or flexible shaft for power. Unique mechanism of unit converts rotary action of power unit to a fast, reciprocating motion. Insertion of a fast power-saw blade into holder provides a fast power-saw that will cut through all metals, wood, plastics, composition and other materials. Ideal for notching and slotting, this full length cutting blade can be inserted to reach those hard-to-get-at places.

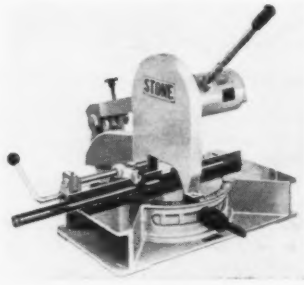


Available from: E-Z Way Tool Co.

E-631

Metal Cut-off Machine

Features claimed: A new machine that performs low-cost cutting of ferrous and nonferrous metals at rate of 4 seconds per square inch, is now in production. Capacity of new model is 1½" solids, 2½" pipe and structurals, and miscellaneous cutting of 2" solids. A semi-high speed saw blade is recommended for cutting nonferrous solids up to 1", and light wall tubing, structurals and extrusions up to 2½". Engineered with positive drive without use of belts, Model M-14 full 3½ hp. geared-in-head motor delivers maximum constant power, thereby increasing cutting speed, affording greater efficiency and insuring longer wheel life.

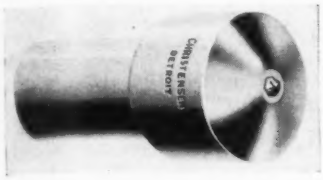


Available from: Stone Machinery Co., Inc.

E-632

Diamonds That Stay Put

Features claimed: Manufactured in a full range of sizes for all grits of grinding wheels, these single-point diamond wheel dressing tools feature an exclusive "C-Metal" mounting method for holding stones. This mounting method insures that diamond is always held in its setting, regardless of vibration or intensity of alternate heating and cooling. Each tool contains one whole natural diamond ranging from fractional to 3 carats in size. Tools are designed for use on any straight face or form wheel dressing operation.



Available from: Christensen Diamond Tool Co.

E-633

Lathe Tool Holder

Features claimed: A new tool holder, available in five sizes, is constructed of heat-treated steel and features screw adjustment for tool height. Once adjusted, tools of the same type can be changed without disturbing height adjustment. It comes equipped with self-aligning knurling head and a pair of medium diamond knurls. Coarse and fine diamond knurls, and coarse, medium and fine straight pattern knurls are available. Boring tools, cutting-off blades and a set of four ground cutter bits are obtainable for boring, cutting-off, turning, facing and threading operations. This all-pur-

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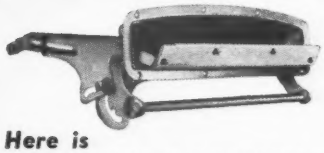

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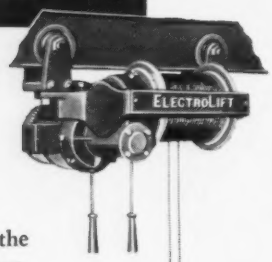


Get the *one* hoist with *all* the advantages: smooth, quiet, fast, safe, and so economical it'll pay for itself in a hurry.

One man handles up to 6 tons—controlling the load to the merest fraction of an inch by push button. Wide range of models, for any use.

Call your ElectroLift representative listed in the classified telephone directory. Or write to:

WORM DRIVE **ELECTROLIFT** HOISTS

ELECTROLIFT, INC., 30 Church Street, New York 7, N. Y.

NO SPRINGS TO BREAK in the *Nutting* JACK

IT'S ALWAYS DEPENDABLE

The Nutting Jack is the ONLY jack operated entirely by gravity and leverage. With no springs to break, there is no danger of your whole jack-skid system suddenly being put out of service.

One lift truck and two dead skids cost about the same as *two Nutting Jacks and twelve semi-live skids*. That's one reason why the Nutting Jack and Skid system can be such a money-saver in your plant. Material stored on semi-live skids is made mobile in a hurry. The jack may be coupled to one skid, then uncoupled and coupled to another faster than the time it takes to tell about it.

Send For Bulletin 48-JS

Look in your classified phone directory for your Nutting representative, or write for Bulletin 48-JS.

Nutting makes everything in floor trucks, wheels, casters

REPRESENTED BY

H. L. Stewart & Associates.....1547 Estudillo Ave., Los Angeles 23, Calif.
Roll-Rite Corporation.....801 Jefferson St., Oakland, Calif.
F. E. Bennett Co.....426 N.W. 6th Ave., Portland 9, Ore.
Secord Sales Company.....95 Connecticut St., Seattle 4, Wash.
H. H. McVeigh.....West 310 First Ave., Spokane 8, Wash.
Equipment Supply Co.....60 Richards St., Salt Lake City 1, Utah
McDonald-Hunt Scale & Supply Co.....1540 Wazee St., Denver 2, Colo.
Egan W. Jones.....5th Ave. at Jackson St., Phoenix, Ariz.
Lee & Chapson, Inc., 755 Sheridan St., P. O. Box 2822, Honolulu 3, Hawaii

our 60th year **NUTTING TRUCK AND CASTER COMPANY**

1722 WEST DIVISION ST., FARIBAULT, MINNESOTA

pose holder eliminates necessity for having different types of tool holders on hand.

Available from: South Bend Lathe Works.

E-634

Toolmaking Setups in One-fourth the Time

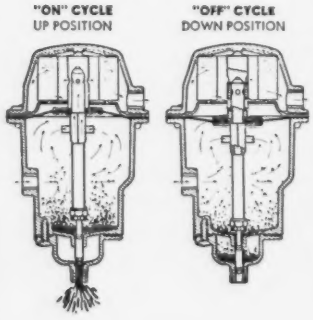
Features claimed: Precision dressing of all angle-tangent-to-radius grinding wheel forms is the purpose of the new Tangi-Matic Dresser. Set-up time is reduced to one-fourth the time usually required by experienced toolmakers, for Jo Blocks, height gages, micrometers and other precision instruments are not needed in the operation. All necessities are built in and offer rapid adjustments and accuracy down to "tenths." Concave radii as small as .032", full 180 deg., are dressed by the instrument when the Small Radius Attachment which comes with the instrument is used.

Available from: Perfex Tool & Gage Co.

E 635

Automatic Valves Clear Air Lines

Features claimed: Compressed air lines, after-coolers, sumps, tanks, and air brake systems are kept clear of contaminants and precipitates, by these automatic valves. Manual attention or adjustment is eliminated, and the line includes automatic separators and drains, field tested. When air line is not in use the diaphragm is forced down by back pressure with O-ring sealing the sump bottom. As air is used the pressure differential raises diaphragm and shaft, seals bottom of middle chamber, opens bottom of sump and blasts out contamination.

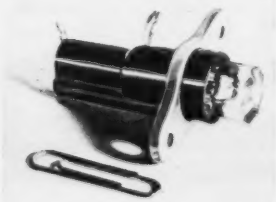


Available from: Wilkerson Corporation.

E-636

Good News for People Who Blow Fuses

Features claimed: This new miniaturized indicating fuse-holder that instantly spots blown fuses is a time saver. Its unique design includes a neon bulb and double contacts molded as an integral part of a crystal clear lens. Neon bulb glows when fuse blows. It can be seen from any angle, giving an immediate indication of trouble. This compact unit needs very little mounting space and is ideally suited to mass production assembly techniques. Its steel mounting plate rivets eyelets or screws to panel with standard production tools.



Available from: Alden Products Co.

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Also further information on the following products advertised in this issue:

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Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

HELPFUL LITERATURE

for the plant operator who wants to keep informed

637-L

Power Bending Catalog

Dries & Krump Manufacturing Company, 7400 S. Loomis Blvd., Chicago, Ill., has for you material illustrating its complete line of steel power bending brakes and power box and pan brakes. Besides complete specifications on all standard sizes of machines, catalog gives details on improved motor drive, better clamping methods employed and easier and more accurate controls that simplify bending operations.

638-L

Jolt Pattern-draw Machines

SPO Incorporated, 6496 Grand Division Ave., Cleveland, Ohio, publishes a 4-page illustrated folder illustrating Series 500 jolt rock-over pattern-draw machines. Design features of machines presented in this publication include centralized controls and adjustable air-locked leveling bars.

639-L

String-on-Finger Dept.

Alden Products Company, 117 North Main St., Brockton, Mass., is releasing information on its static magnetic memory computer. Booklet elaborates on potential use, operating characteristics and application techniques of this storage device which requires no mechanical movement in recording, no power to maintain storage information, and which has a variable information handling rate ranging from 0 to 30,000 pulses per second.

640-L

Engineering Info

"Engineering Formulas & Tables" contains 350 pages of basic formulas, design data, and tables for three branches of engineering—civil, mechanical and electrical. Sections on mathematics, measures, materials, gages, screws, mechanics, electricity and magnetism, hydraulics, structural data and mathematical tables are included. Available from *Lefax Publishers*, Philadelphia 7, Pa.

641-L

Cemented Carbide Tools

A complete listing of specifications and prices of *Kennametal's* complete line of cemented carbide tools is yours by writing to that manufacturer in Latrobe, Pa.

642-L

Payroll Shortcuts

Industrial management changing over from civilian to defense production will be interested in three folders entitled, "Three Ways to Stop Payroll Headaches—Before They Start." Each folder shows management how to get the jump on possible payroll problems by incorporating latest simplified machine accounting procedures. Write to *Management Controls Division, Remington Rand, Inc.*, 315 Fourth Ave., New York 10, New York.

643-L

Robot Operators for Doors and Gates

A comprehensive coverage of modern automatic operating equipment for doors and gates is offered by *Robot Appliances, Inc.*, Dearborn, Mich. Booklet summarizes accomplishments in this field during past 20 years.

644-L

Things You Should Know About Ladders

"There's a Right Ladder for Every Job," may be obtained currently from *American Ladder Institute*, Chicago, Illinois. Purpose of pamphlet is to acquaint users with all available data regarding ladders.

645-L

"Sticky" Brochure

More than 30 uses for four "Scotch" brand electrical tapes in construction and maintenance work are described in an 8-page folder by *Minnesota Mining and Manufacturing Co.*, 900 Fauquier St., St. Paul, Minn. Booklet lists color, thickness, tensile strength, elongation, adhesion, fusion, dielectric strength and constant, insulation resistance, power factor and electrolytic corrosion factor for each tape type.

How Much Do You Spend for Lamps?

YOU OWE IT TO YOURSELF TO FIND OUT . . . HOW YOU CAN BENEFIT FROM USE OF CHAMPION LAMPS

- **Quality Controlled**—All processes and materials used in the manufacture of CHAMPION LAMPS are constantly controlled by regular, exhaustive tests.
- **Better Lighting**—CHAMPION LAMPS will help you get more light for every cent of current consumed.
- **Lower Costs**—CHAMPION LAMPS cost less than any other lamp of equal quality.
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It will pay you to ask your CHAMPION distributor for a quotation on your lamp requirements

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WHEN YOU USE EASTMAN TAGS

35 years have given us the know-how to make your tags do the job your business demands. Trained salesmen are at your disposal in each of our fourteen sales offices, ready to show you why EASTMAN tags are different. Modern automatic equipment and efficient operation makes our low prices to you possible.

CONSULT Phone Book Or Write For Prices and Samples TODAY!

Of Course, No Obligation.

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TAG and LABEL CO.
THREE WESTERN PLANTS

San Francisco 7 · Sacramento 2 · Portland 5 · Spokane 8 · Los Angeles 1 · San Jose · Salt Lake City 1 · Seattle 22 · Phoenix · Denver · Tacoma · Fresno · Oakland · Honolulu

646-L

The Easy Way

"Measure Time Accurately," a new booklet published by *Bell & Howell Company*, 7100 McCormick Road, Chicago, Ill., is designed to acquaint executives with advantages of explaining time and motion study by use of motion pictures.

647-L

Fire Brick

Available from *Johns-Manville*, 22 East 40th St., New York, is pamphlet entitled "JM-3000 Insulating Fire Brick," which lists economic advantages, industrial application and refractory properties of this product. Physical and thermal characteristics are given in table form.

648-L

6,000-Pound Fork Trucks

Baker Industrial Truck Division of Baker-Raulang Company, 1250 W. 80th St., Cleveland, Ohio, releases a new 8-page specification bulletin which includes dimensions and other features of their new 6,000-pound fork trucks.

649-L

Chain Conveyor Bulletin

"How to Build Profits by Cutting Handling Costs" is subject of a new bulletin by *Chain Belt Company* of Milwaukee, Wis. Piece stresses importance of selecting correct method for materials handling, and illustrates application of units.

650-L

For Easier Loading

A special engineering folder for industrial users of lift trucks faced with unusually difficult handling problems is printed by *Towmotor Corporation*, Cleveland, Ohio. Four-page leaflet illustrates many devices specially designed by this company to grip, clamp, grab or support almost any type of load, and lift, transport, unload, deposit, dump, upend, or completely revolve it.

651-L

Piping Pointers

A new handbook covering fundamentals of sound piping practices in non-technical language, and discussing various types of valve designs and how each should be used is available from *Crane Co.*, 836 S. Michigan Ave., Chicago, Ill.

652-L

Oil Burners

Hauck Manufacturing Co. is offering to our readers a new catalog which features Hauck's new long nose type, low pressure, air atomizing oil burners. Catalog may be obtained by writing this manufacturer at 124-136 Tenth Street, Brooklyn, New York.

653-L

Rubber Mitts

Released by *American Rubberizing Company*, 617 11th Avenue South, Minneapolis, Minn., is a 4-page bulletin which reviews the processing of canvas and cotton knit gloves with natural rubber, Neoprene or Plastic. Complete range of styles, sizes and colors is listed in the brochure.

654-L

Commie Protection

"Protecting Your Company's Security," a 13-page "blueprint" now being distributed by *Member Relations Division, Research Institute of America Inc.*, outlines precautions which industry should take to prevent Communist sabotage. Report discusses methods of determining whether or to what degree a company is vulnerable, policy adjustments, organization of security programs, detecting subversive personnel elements.

655-L

U. S. Rubber Catalog

A resumé of engineering data on *U. S. Rubber Company's* line of oil, gasoline, liquefied petroleum gas, water, steam and air hose used in refinery operations, is offered by the manufacturer, by writing to headquarters at Rockefeller Center, New York.

656-L

Automatic Dial Index Feed

"Increase Production with Speedex" is title of description leaflet issued by *de Castro & Associates*, 1515-17 Santa Fe Avenue, Los Angeles, Calif. This presents details of design on the company's automatic dial index feed.

657-L

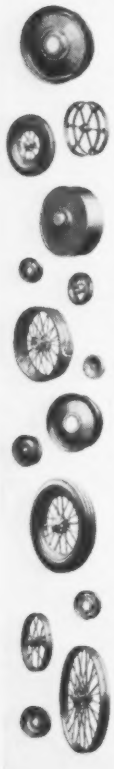
Boosters

Practical advantages and applications for "Dual Pressure" boosters, developed since the war and manufactured on low cost production line basis from standard air and hydraulic cylinder components are highlighted in an editorial reprint which is now obtainable from *Miller Motor Company*, 4027 N. Kedzie Avenue, Chicago, Ill.

658-L

Two-Speed Transmissions

Western Manufacturing Company, 3400 Scotten Avenue, Detroit 10, Mich., issues a



FOR FARM AND INDUSTRY

ELECTRIC

WHEELS ARE RIGHT

Over 65 years in wheel manufacturing have given us the "know how"—modern production methods assure long life and efficient wheel performance in the field.

There is an ELECTRIC spoke or disc wheel for most types of portable equipment. Axles are available where required.

Our experienced engineers are ready to assist you in solving your wheel and axle problems and we will offer our recommendations upon receipt of your specifications.

WRITE FOR CATALOG

ELECTRIC WHEEL CO.

2812 CHERRY, QUINCY, ILL.

MUSIC WIRE SPRING CLIPS

These music wire retaining clips are easily assembled and removed without special tools and with no damage to the clips. Grip is positive and the re-use feature is a boon to maintenance. Immediate delivery for shafts from 1/8" to 3/8" dia.

To Solve Retaining Clip Problems

Call CONNOR

CONNOR SPRING Manufacturing Co.

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SUtter 1-1443

CALL CONNOR

3901 S. Broadway Place
LOS ANGELES 37
ADams 3-5279

two-page catalog featuring its two-speed transmissions, used to supplement constant-speed and multi-speed motors with the advantage of providing broader speed rates and special ratios which are not obtainable electrically.

659-L

Roller Chains from Stock

A new catalog, RS-50, covering a full line of roller chains and sprockets from stock is released by *Whitney Chain Company*, Hartford, Conn. Catalog provides complete specifications and engineering reference tables on American standard roller chains, sprockets and attachments, as well as dimensional data, strengths and weights.

660-L

Seven Load Cells

Baldwin-Lima-Hamilton Corp., Philadelphia, Pa., publishes a 2-page bulletin which illustrates and gives specifications for a line of seven type "U-1" SR-4 universal load cells ranging in weighing capacity from 500 to 50,000 pounds in tension and compression. Cells depend upon electrical resistance measurements of SR-4 resistance wire strain gages bonded to steel columns.

661-L

Expansion Joints

Bulletin 351, released by *Zallea Brothers*, Wilmington, Delaware, gives sizes, dimensions, suggested applications and other technical data on a variety of joints from small flexible connectors used on diesel exhaust lines to 30-foot diameter self-equalizing joints used in such applications at wind tunnels.

662-L

Job Study

Towmotor Corporation, Cleveland, Ohio, has prepared for the auto parts manufacturing industry a certified job study showing how 160 man-hours per week were saved in handling and transporting materials within a typical plant. Also shown in detail are methods which reduced loading costs, tripled warehouse capacity, and eliminated costly employee injuries.

663-L

Especially for Foremen

Foremen and supervisors, attempting to keep abreast of new developments in their field, will be interested in "The Foreman's Digest," a new monthly periodical consisting of condensations from other current publications on subjects relating to their line of work. For further information write, *The Foreman's Digest*, Englewood, New Jersey.

664-L

Wood Treating

"Preliminary Wood Preservation Statistics" for 1950 is released by Division of Forest Economics, Forest Service, *U. S. Department of Agriculture*, Washington, D. C. This is made available in cooperation with *American Wood-Preservers' Association*, and figures are based on reports from 267 plants representing more than 95% of U. S. wood treating capacity.

665-L

"Saw Tips"

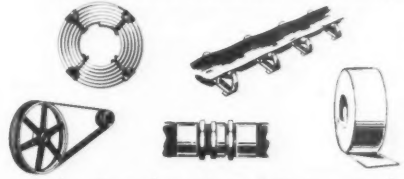
DeWalt, Inc., Lancaster, Pa., publishes a weekly sheet on problems, techniques and methods in woodworking. Such subjects as terminology and set-ups are discussed in each issue of "Saw Tips." Copies distributed without charge.

REPUBLIC'S ORDER DEPARTMENT Makes Your Minutes Count!

CALL REPUBLIC SUPPLY ...first for service

No waiting at Republic! When you call Republic, you talk to courteous order experts who can save you time and money. Because they have all the necessary information at their finger tips, they will help you enter your order quickly and accurately. You are sure to receive exactly what you ordered—when you want it. To make minutes count all around, call *Republic Supply first!*

A *Complete* Line of INDUSTRIAL RUBBER PRODUCTS



...and a Complete Line of Piping, Tools, Wire Rope, Machinery and Industrial Supplies

THE REPUBLIC SUPPLY COMPANY OF CALIFORNIA

AN INDEPENDENTLY OWNED AND OPERATED COMPANY SERVING WESTERN INDUSTRY

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LONG BEACH • STOCKTON • SAN JOSE • VENTURA • SACRAMENTO • AVENAL • FRESNO
SANTA MARIA • CUYAMA • NEWHALL • TAFT

HORTON TANK in MANILA

The Horton elevated tank at the Philippine Manufacturing Company, Manila, P. I., provides dependable water pressure *24 hours a day*. Mechanical breakdowns or power shortages have little effect on water availability when gravity supplies the pressure.

Give your plant an independent water supply that's always ready to go. Install a Horton elevated tank.

CHICAGO BRIDGE & IRON COMPANY

ATLANTA 3.....2144 Healey Bldg.
BIRMINGHAM 1.....1560 North Fiftieth St.
BOSTON 10.....1065—201 Devonshire St.
CHICAGO 4.....2132 McCormick Bldg.
CLEVELAND 15.....2256 Guildhall Bldg.
DETROIT 26.....1567 Lafayette Bldg.
HOUSTON 2.....2164 National Standard Bldg.
LOS ANGELES 14..1570 General Petroleum Bldg.
NEW YORK 6.....1334—165 Broadway Bldg.
PHILADELPHIA 3.....1666-1700 Walnut St. Bldg.
SALT LAKE CITY 4.....568 West 17th South St.
SAN FRANCISCO 4.....1578—200 Bush St.
SEATTLE 1.....1369 Henry Bldg.
TULSA 3.....1667 Hunt Bldg.
WASHINGTON 6, D. C.....1103 Cafritz Bldg.

READING GUIDE FOR WESTERN MANAGEMENT

A service for all management levels . . . current literature surveyed and appraised by the faculty of the School of Management, Golden Gate College

Selecting and Inducting Employees

By George D. Halsey, Harper and Brothers, New York, 1951, $4.50.

This volume presents a useful compilation of the more commonly used office forms, tests and procedures for employee selection, placement and reassignment. At the risk of oversimplification, it can be described as an "annotated catalog" of such material, to distinguish it from more detailed, critical and professionally thorough texts.

The first part of the book is devoted to topics related to interviewing, application forms, and the physical examination. The author is to be commended for brevity and clarity in presenting material which is fairly well accepted as standard procedure in modern employment offices. Eleven brief chapters discuss testing programs, methods of developing and validating tests, and the standardized tests available on the market. Another chapter describes the recruiting and testing procedures in use by several well known manufacturing plants, and the tests available through the American Transit Association.

The author has some constructive comments on the employment of older workers and the physically handicapped.

Testing procedures, as well as more systematic, scientifically sound methods in interviewing are being studied with the help of professionally competent consultants by a few large local corporations. The number is all too few in view of the importance of this subject to both employees and management. As the author points out, even in a tight labor market, efficiency can be substantially increased by more selective original placement of the available manpower and by careful reassignment after employment.

Reviewed by
DR. ROY W. KELLY
Lecturer in Personnel Administration.

Briefer Guides From The Management Library

Management Development: Case Studies

Metropolitan Life Insurance Company, Policyholders Service Bureau, 1950.

This report is one of a series describing methods of developing managerial competence in business. Examples were solicited from companies that have done outstanding work in management development, and the following are represented by case studies: National Biscuit Co., Aluminum Co. of America, General Electric Co., Johnson & Johnson, SKF Industries, Inc., and U. S. Steel Corporation.

Economics of National Security

Edited by G. A. Lincoln and others. Prentice-Hall, Inc., New York, 1950, $6.65.

With "peace through power" and "mobilization for survival" as major themes, this book stresses the necessity for total economic effort. Discussed are such aspects of total security as wartime emergency organization, the economic effects of our alliances with other nations, the industrial mobilization program, war finance, and economic control of the home front through prices, rationing, wages, and manpower.

Compensation and Pensions of Executives

National Industrial Conference Board, New York, Studies in Personnel Policy No. 111, 1950.

This report compiles the latest statistical data available on salaries paid to top executives. Aggregate payments to officers and directors and the individual salaries, bonuses, and estimated pensions are tabulated for each of the three highest paid executives in more than 1,275 companies.

How to Pick Leaders

By G. L. Freeman and E. K. Taylor. Funk and Wagnalls, New York, 1950, $3.50.

Two psychologists discuss factors in selection of leaders such as personality, aptitude and proficiency, emotional control, ethics, adaptability, ability to get along with people as individuals, group leadership, ability to delegate work, etc. These principles were applied to officer candidates during World War II and are here related to the field of business.

Reviewed by
BERNA M. CARLSON
College Librarian.

THE WEST ON ITS WAY

ARIZONA

GROUND LOOP—Property at Bisbee-Douglas International Airport, owned by Cochise County, is leased jointly by Air Facilities, Inc., Arizona, and Aircraftsmen Co., Inglewood, Calif., for defense contract work. Subcontracting for several large California firms, the companies will produce guided missile components and aircraft component parts. Peak production may necessitate employment of up to 1,500 persons, although the beginning number will be approximately 500.

CALIFORNIA

PROP TESTS—Oakland Municipal Airport is home of Howell Propellor Service's newly established quarters. Equipment includes a propellor-testing pit large enough for a B-36 prop, and the most modern "governor" test machine in the country. Ivan Cooper, Jr., is manager and chief engineer.

ATOMIC STUDY—Among companies chosen to take the initial steps toward eventual industrial use of atomic energy are Pacific Gas & Electric Co., and Bechtel Corporation of San Francisco. These firms have contracts with the AEC to study the practicability of business and industry building and operating reactors for production of fissionable materials and power. Bechtel and PG&E will conduct this research at their own expense, and the final decision as to whether or not any plants will be constructed rests with the Government.

PAC SCHEDULES OVERHAUL—Pacific Airmotive Corporation, headquartered at Anchorage, Alaska, will overhaul all of Pacific Northwest Airway's aircraft engines. All work on these engines will be processed at PAC's Burbank, California headquarters. Procedure is made possible through a rotation plan on spare engines.

STECHER-TRAUNG GROWS BIG—Stecher-Traung Lithograph Corporation, San Francisco, expands its present floor space approximately 75% by acquisition of a six-story factory building adjacent to its present quarters on Battery Street. This expansion, necessitated by increased business volume, will accommodate newest type of lithograph equipment.

EXPANDING CYANAMID—A 64,000 square foot building is soon to be built in Los Angeles' central manufacturing district under contract with John M. Stahl and Buttress and McClelland, Inc., for subsequent long term lease to American Cyanamid Company's West Coast Division. This one-story building will consolidate the company's various warehouse facilities now scattered around the area and provide additional office space. Building will be of pre-cast concrete and steel girder with Arizona sandstone of variegated colors for the front office. Design includes a central patio which provides interior offices with daylight.

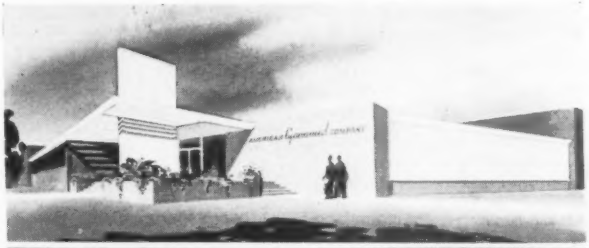
WEATHER PLANT—As part of their $4,000,000 research expansion project, Lockheed Aircraft Corp. is building a weather factory soon to be able to duplicate all types of atmospheric punishment found up to 75,000 ft. One entire floor of the 4-story structure will house the environmental test chambers. Result will be aircraft better able to fly 24 hours a day, at maximum altitudes, in any part of the world.

AIR BEFORE EAR—For the new supersonic tunnel at Ames Aeronautical Laboratory, Moffett Field, Calif., General

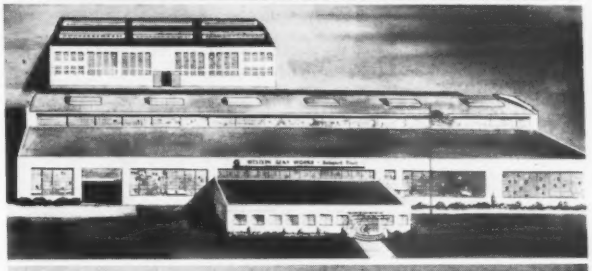
New Buildings for Four Western Plants

(for details, see items on this and the following page)

More office space and a centralized warehouse for American Cyanamid



Western Gear builds at Belmont



Republic Supply speeds construction in San Leandro

Ryan's addition will house factory for jet engine components

Electric is building a giant wind tunnel drive capable of generating airstreams several times faster than sound. This four-motor unit is rated at 180,000 hp., with a one-hour output peak of 216,000 hp. Motors each will weigh 144 tons, and will operate in tandem on a single shaft which in turn will rotate two 17-foot compressors. Compressors will stir up blasts of air that will reach peak velocity in tunnel's eight by eight foot test chamber.

MORE BRAKE SHOES—A new 50,000 sq. ft. brake shoe plant, which will rise on a 19 acre tract, employ about 75 workers, and produce 1,000 tons of brake shoes monthly, is soon to be erected in Pomona by American Brake Shoe Co., to replace its Los Angeles plant.

ANNEXED TO ANAHEIM—City officials at Anaheim have agreed to annexation of a large site west of the city, which will accommodate a new industrial plant constructed by Robertshaw-Fulton Controls Co. Annexation was arranged in order to provide Anaheim water for this 2,000-employee, 21-acre plant.

PAPERBOARD—California Paperboard Company begins construction of a six acre paperboard mill at Richmond, Calif. Mill will have estimated capacity of 70 tons per day and best grade of board produced will be double white patent coated news. Company will also manufacture the usual combinations of filled grades in both double and single coated stocks. Capitalization of company is $1,000,000.

ANOTHER CANNERY—Filice & Perrelli Canning Company, Richmond quality fruit-vegetable canning operation, commences construction of a third cannery on a 22-acre site at Merced. Figs and Elberta peaches will be its initial products, with a larger variety to follow.

GEAR FOR THE ARMY—Western Gear Works, Lynwood, plans a $2,000,000 gear manufacturing plant at Belmont, Calif. Construction will begin almost immediately on this 300 employee structure, and output will consist of special gear drives for a new type vehicle in the Army's tank program.

MORE ABOUT JETS—Ryan Aeronautical Company, San Diego, begins construction of a new $300,000 building of steel and stucco, 250 by 300 feet, on west end of company's 40-acre plant site. More than $2,000,000 worth of new production machinery will equip this addition which is to be used exclusively for manufacture of combustion chambers, exhaust cones, tailpipes, exhaust nozzles and other precision-built, stainless steel components for jet engines.

FOR UNCLE SAM—General Warehouse Company will build a $2,000,000 warehouse in South San Francisco to be leased to General Services Administration of the Federal Government, which will distribute around three-quarters of a million dollars of Government commodities monthly to 321 different Federal ordering offices in California, Nevada, Arizona, Hawaii, Guam and Samoa. Contractors are Barrett & Hilp, San Francisco, and architects are Ward & Bolles, also of San Francisco.

PROGRESS REPORT—Republic Supply Company of California is speeding construction of its new Northern Division main headquarters at San Leandro, California. New plant and pipeyard will occupy a ten-acre site, about 850 feet from new East Bay Freeway, and will replace present regional headquarters in Emeryville. Swinerton and Walberg are contractors for new plant which will include warehouse, offices and pipeyard similar in design to Republic's main headquarters in Los Angeles. This firm also opened an enlarged headquarters at Ventura on May 16.

TERMINALS BY THE PAIR—Texas Oil Company soon is to begin construction of a $3,500,000 marine terminal on Santa Fe Channel property in Richmond. Terminal is to be in operation by mid-1952 on a 25-acre site. Pacific Marine Terminal Company, San Francisco, is given a $1,435,000 loan by Defense Production Administration for building a marine petroleum and distribution storage terminal in this same area.

POWERFUL ADDITIONS—Pacific Gas and Electric Company expands its construction program by an $86,000,000 power project which will add 500,000 kilowatts of steam-generated electric capacity to the Company's system. Four 125,000-kilowatt generating units have been ordered for this new development, and at least one is expected to be in operation by late 1953. Locations for these generators have not as yet been determined. These and other additions will bring company's postwar investment to over $1,000,000,000.

CHEMICALS FOR THE WORLD—World-wide distribution of industrial chemicals is job of new Talchem Division of Transocean Air Lines. Division headquarters are at 15890 Hesperian Boulevard, San Lorenzo, and distribution of 110 chemical specialties and cleaning compounds for the aircraft, automotive, marine and industrial fields of Jackson Chemical Company, Los Angeles, has commenced.

A PLANT BY ANY OTHER NAME—Norris Stamping and Manufacturing Company will henceforth share a joint title with its wholly-owned subsidiary, Thermador Electrical Manufacturing Company. New name is Norris-Thermador Corporation. This change in title does not alter financial structure of the company and Thermador will continue to operate as a separate corporation.

TRAILERS GO G. I.—Trailmobile Company, Cincinnati, is awarded a government contract for production of specially-designed military type trailers for use in shipyards and Army depots on Pacific Coast. For security reasons amount of contract and number of units involved are not disclosed.

HARNISCHFEGER GOES WEST—For the first time in its history Harnischfeger Corporation, Milwaukee, Wisconsin, establishes a district division for regional operation. This new Pacific Division, located in Los Angeles, will be District headquarters for the Los Angeles, San Francisco, Seattle and Denver branches. Present plans call for fabrication facilities of P&H overhead cranes.

NEW CARLSBAD GENERATING PLANT—San Diego Gas & Electric Co. plans construction of a $12,000,000, 75,000-kw. turbo generating plant at Carlsbad, Calif.

SAY IT WITH PLASTIC—Juel Corp. and Calresin Corp. of Los Angeles have combined to form Santa Anita Chemical Corp. for supplying basic resins for the Pacific Coast plastic industry. These companies will continue operations as separate firms, but as subsidiaries of the parent company, for producing plastic products. Parent company will also have a separate plant in Arcadia, Calif.

SMOG CURE—Shell Chemical Corp., Pittsburg, Calif., constructs a $60,000 stainless steel fume disposal unit to burn disagreeable waste gases which would otherwise be dispersed into the air. This unit funnels disagreeable gases through a blower system into a huge brick furnace in its boiler building where they are burned. This is considered a major step in the prevention of smog.

DEFENSE IS HERE TO STAY—Over $77,000,000 in defense contracts has now been awarded to Rheem Manufacturing Co. Newest contract calls for U. S. Navy cartridge cases to be produced at Rheem's San Pablo plant where special equipment valued at several million dollars has been installed to do the job. Some 500 employees are also added in connection with this contract. Company expects to produce defense material at a rate of $5,000,000 worth per month. However, so far, curtailment of company's regular manufacture of home appliances has not been necessary.

PRECISION MOVES—Precision Sheet Metal, Inc., plans to sell its Culver City factory and move to a new plant in the Los Angeles international airport industrial district. Plant will cost approximately $1,000,000 and will triple this firm's production capacity in manufacturing aircraft parts.

FISH STORY—F. E. Booth Co., Inc., San Francisco packer of sardines and tuna specialties, purchases Golden State Packing Corp., Long Beach, Calif., to supplement dwindling sardine production in northern California. Capacity of plant is around 300,000 cases annually. Tuna packing operations will be continued in Booth's San Francisco plant.

THE JET WORLD—Lockheed Aircraft Corp., Burbank, receives additional Navy orders for large quantities of T-33 and TP-2 jet trainer planes. This order, to be produced at an accelerated World War II pace, will extend into the summer of 1953. Trainer plane is a two-seat version of Lockheed's F-80, world's first mass-produced jet, and is powered by an Allison jet engine developing a maximum static thrust of 5,400 pounds.

BURBANK GETS "GAY"—Wilcox-Gay Corp., Charlotte, Mich., leases an 85,000 sq. ft. factory in Burbank for increased manufacture of Majestic television and radio receivers and Wilcox-Gay recordios. This plant, scheduled to go into production almost immediately, will include straight line mass production facilities patterned after the firm's Charlotte and Brooklyn plants.

COLORADO

GETTING MORE LINE—Colorado Interstate Gas Co. announces a two-year, $3,453,000 construction program to meet anticipated needs in the Rocky Mountain area. Firm has applied to Federal Power Commission for permission to increase the capacity of its recently authorized 216-mile natural gas pipeline

extending from west Panhandle gas field in Texas to Cheyenne County, Colorado.

THAT PRECIOUS STUFF — Climax Uranium Company at Grand Junction was granted a certificate of necessity to spend $910,000 to expand production of uranium oxide on Colorado's western slope—home of A-bomb raw material. This comprises a part of a $2,000,000 sum for commercial building in a four-state area granted recently by National Production Authority.

IDAHO

GROW THEIR OWN—Bunker Hill & Sullivan Mining & Concentrating Co. is growing its own mine timbers. This company, which uses around six million feet of lumber a year, is utilizing about 19,000 acres of land in the Coeur d'Alene district for tree farming. Two thousand trees are planted now and company plans to plant about 25,000 to 50,000 a year.

SHARE AND SHARE ALIKE — Newmont Mining Co., New York state, New Jersey Zinc Co., and Hecla Mining Co. of Wallace, Idaho, are jointly organizing a company to develop properties of Atlas Mining Co. near Mullan, Idaho, which has produced lead, silver and copper. These companies would divide equally 500,000 shares now owned by Atlas and Coeur d'Alene Lead Co., and would acquire Atlas property upon completion of certain conditions, if the plan is accepted.

MONTANA

CHROME — Chromium Mining and Smelting Corp. plans construction of a $1.5 million electrometallurgical plant at Glendive, Montana, to manufacture around 2,000,000 pounds of ferrochrome a month from low grade Montana chromite ore and 15,000 kw. of power. This operation will probably continue after present emergency.

NEVADA

BASIC MAGNESIUM BIDS—Two firms have submitted bids for facilities at the state-owned Basic Magnesium plant near Henderson. Dynamic Air Engineering Co., Los Angeles, plans to construct a factory on a site near Hoover Dam costing an estimated $100,000, which would employ about 100 workers for manufacturing air blowers for transport aircraft and radar equipment. Molybdenum Corp. of America would construct an electrolytic plant for processing ores mined at its Mountain Pass operation in Nevada.

GOULD IN THEM THAR HILLS—A new $500,000 fluorspar mill is being erected at Baxter mine, Broken Hills, Nevada, by H. W. Gould and Co., San Francisco, which will have a 250-ton daily capacity and will produce both metallurgical and acid grades. Baxter mine is one of the largest fluorspar deposits in the country.

ALOHA BENZENE—The first export shipment of benzene from the Hawaiian Islands, totaling 300,000 gallons, was

At Left: The Model 180-P with pneumatic tires is only one of the new line of trucks that incorporate many NEW engineering features.

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hoist cylinder trunnion mounted
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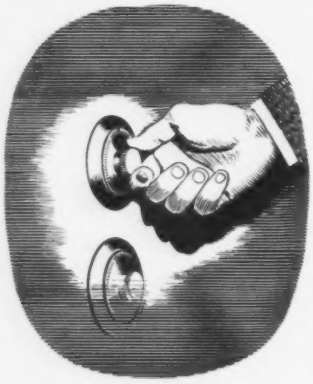

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trucked in May from Stauffer Chemical Company's storage facilities at Los Angeles Harbor to the Stauffer plant at Henderson, Nev., for manufacture into benzene hexachloride and DDT insecticides. Destructive cracking of oil into gas by the Honolulu Gas Company provides benzol as a by-product, which is refined into benzene by Pacific Refiners, Ltd., at their new plant at Honolulu.

NEW MEXICO

FIRE STATION—A fire station on South Mesa at U. S. Atomic Energy Commission Santa Fe Operations at Los Alamos will provide protection for Technical Area and part of Western Area, including the Medical Center and various school facilities. Building will be about 71 x 72 ft., 2 stories high, constructed of monolithic reinforced concrete. Estimated cost will be from $200,000 to $250,000.

BACK TO ALBUQUERQUE — U. S. Atomic Energy Commission Santa Fe Operations office is being transferred from Los Alamos to Albuquerque, in order to relieve Los Alamos from providing necessary space and services to a headquarters concerned primarily with work at other locations. Approximately 230 positions will be established at this Albuquerque headquarters, representing a total of about 15 per cent of the AEC employees now at Los Alamos. Some in each staff unit will be transferred, the remainder being reassigned to positions in a new Los Alamos field office organization.

OREGON

BUYS PAPER BOX FACTORY—V. N. Rigby purchases Oregon Paper Box Factory, Portland, from F. L. Dielschneider.

PORTLAND GETS TRU-VUE — Sawyer's, Inc., Portland manufacturer of View-Master stereoscopes and reels, buys Tru-Vue, Inc., Rock Island, Ill., and will move production to Portland. Tru-Vue name is being retained.

YALE PLANT LICENSED — Pacific Power and Light Co., Portland, is granted a 50-year license by Federal Power Commission to construct the Yale Hydro-electric plant on Lewis River in Washington. Cost of initial installations is estimated at $26,450,000, and plans call for a 205 foot high dam, a 9 mile reservoir, and a low dam, 1,600 feet long and 30 feet high.

TACKING TICKING — Sound Mattress and Felt Company, Tacoma, purchases Willamette Builders Supply Company building at 3719 S.W. Macadam Ave., Portland, and plans to operate it as a branch plant for production of felt for furniture trade.

BED TIME STORY—Another national manufacturer of mattresses, the Englander Company, opened a warehouse in Portland last year. Branch is now expanded and is actually manufacturing mattresses in Portland.

GOOD CONNECTIONS—Firestone Tire and Rubber Company, Los Angeles, awards a sub-contract for manufacturing track and connectors for armored vehicles to Production Manufacturing Company. Schmitt Steel Company is also taking part in this work.

OUT OF MOTHBALLS — Thirty-two naval vessels, now in layup at Tongue Point, Astoria, are being overhauled by two Portland shipbuilding firms, Albina Engine and Machine Works and Willamette Iron and Steel Company.

CLEANLINESS IS NEXT — Quartermaster Corps awards a $50,000 contract for laundry soap to Mt. Hood Soap Company, Portland.

DOUBLE OR NOTHING — Plans are under way for doubling capacity of Electro Metallurgical Co.'s capacity. This Portland firm, a division of Union Carbide & Carbon Corp., will extend some of its present buildings and add electric furnace units. Employment will be increased from 175 to 300.

ZIRCONIUM PRODUCTION EXPANDED—U. S. Bureau of Mines' zirconium metal plant at Northwest Electrodevelopment laboratory, Albany, is to have a $350,000 increase in plant capacity. This just recently completed plant is largest U. S. producer of high purity ductile zirconium metal. Original process developed at Albany utilizes zircon beach sands as a primary raw material.

NEW CHEMICAL PLANT FOR SALEM—Ray-O-Vac Battery Company, Madison, Wisconsin, purchases Continental Chemical Company, Salem. Continental re-designed and re-equipped this wartime aluminum-from-clay plant for production of battery-active manganese dioxide from low grade manganese ore. New owners will continue manufacturing this product, and will also make ammonium sulphate as a by-product.

NEW POWER NEEDS — Bonneville Power Administration's 1951 advance program for defense recommends mobilization of Pacific Northwest's power resources to add more than 2,000,000 kw. of installed capacity by 1953-54. This increase would represent 1/10 of nation's expansion. Recommendation calls for accelerated construction of McNary and Chief Joseph dams, and commencing of work on The Dalles, Ice Harbor and Hell's Canyon, and Oregon-California inter-ties.

WASHINGTON

NEW COPPER PRODUCER—Kromona Mines Corporation purchases a 100-ton copper flotation milling plant from Denver Equipment Company which is soon to be installed at a mine site 19 miles northeast of Sultan, Washington.

METERS FOR RICHLAND—Industrial Electric Company, Seattle, is low bidder ($109,998) for installation of 5,115 electric meters in Richland, Washington. Work will involve installation of 5,037 residential meters and 78 commercial meters and appurtenances.

INCREASED ZINC-LEAD MINING—Zinc-lead ore mining companies, now operating near Metaline Falls, Washington, and Salmo, B. C., plan to increase production to around 2,000,000 tons of ore a year, about double the amount now being taken out of the ground. Among firms producing in this area are

Pend Oreille Mines & Metals Co., Reeves McDonald Co., Canadian Exploration Co., and Grandview Mines, operated by American Zinc, Lead & Smelting Co.

ALCOA GOES TO WENATCHEE—Wenatchee is site selected for a new aluminum smelting plant, capable of supplying 170,000,000 pounds of aluminum annually. Construction will begin almost immediately on this plant adjacent to Rock Island Dam, 12 miles south of Wenatchee. Electric power will be made available from Government facilities on Columbia River and from Rock Island Dam which will be expanded by Chelan County Public Utility District under agreement with Puget Sound Power and Light Company, owner of present development.

New plant, which will employ approximately 800 people for its initial operations, will increase America's aluminum production capacity by 25%.

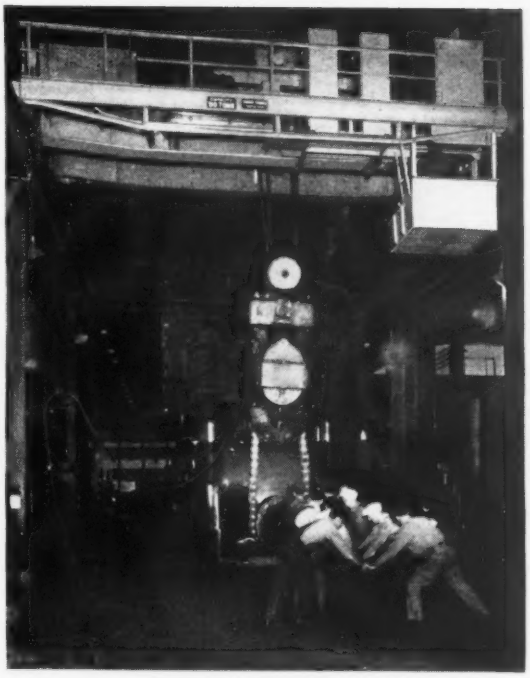
NEW DIGGIN'S — Owners of Pacific Northwest's only strontium mineral mine, William E. Caldwell and George Waterman, are letting a contract to mine a considerable tonnage of this ore and to further explore deposit. Mine is located at tip of Fidalgo Island in Puget Sound.

ELSIE MAY GO TO TACOMA—Borden Company of New York is applying for an NPA permit to construct a rescorcin plant in Tacoma.

New Aviation Warning Light

A NEW NEON-TYPE aviation warning light has been developed jointly by the engineering experiment station of the Division of Industrial Research of Washington State College and the Bonneville Power Administration. It will be used to light high-voltage power spans at river crossings and adjacent to airfields. Unlike incandescent lights now in service, it draws its power from the high-voltage line to which it is attached and does not require a separate wiring unit. Suspended at mid-span, the neon tube is operated by the electromagnetic effect between the cable and a small transformer.

First experimental model of the new light has been installed near Reardon, Wash. A special power-driven trolley, likewise developed by the Engineering Experiment Station, will be used in making the installation. The trolley propels the neon-light assembly to any point on the span. Relay controls on the ground then clamp the light fixture in place, uncouple the trolley, and return it to the tower. This eliminates the danger and the tedious procedure which would be involved if a lineman were to ride out on the cable in a bosun's chair. Professor Homer J. Dana, director of the engineering experiment station, who has been in charge of the project at W.S.C., estimates the new light will have a life of 50,000 hours—more than seventy times the life of present lights.



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WESTERNERS AT WORK

Arizona

Gelber

MURRAY S. GELBER, vice president and secretary of *The Garrett Corporation*, Los Angeles, is appointed vice president and manager of *AiResearch Manufacturing Company of Arizona*, a division of The Garrett Corporation. Gelber's new offices are in Phoenix.

The business development section of the Northwest Electric Light and Power Association at its annual meeting in Portland May 7-9 heard power company executives project a five-year building program. Key figures of the opening session were from left, *H. M. Kelley*, appliance sales manager, Frigidaire division of General Motors Corporation, Dayton, Ohio, who delivered the keynote address; *Guy Davis*, Pacific Power & Light Company, Yakima, conference general chairman; *George T. Bragg*, vice-president and general manager, Pacific Power & Light Company, who welcomed the delegates to Portland; and *Thomas W. Delzell*, chairman of the board, Portland General Electric Company, and president of the association.

California

Manager of newly created Foundry Division of *Rosan, Inc.*, South Gate, is ALAN CAMERON. Cameron had been operating his own marine hardware manufacturing business prior to accepting this position. ARNOLD HELGESON takes over as foundry supervisor for this entire new division.

LAURENCE R. KELTNER, manager of *B. F. Goodrich Company's* Los Angeles tire manufacturing plant since 1947, becomes director of employee relations for the entire company, with headquarters in Akron, Ohio.

E. C. CORSON, JR. assumes position of credit manager of San Francisco territory for *Federated Metals Division, American Smelting and Refining Co.* His new territory includes Portland, Seattle and Salt Lake.

HARVEY A. LYNN takes over as president of *Fruit Growers Supply Company*, manufacturing subsidiary of *California Fruit Exchange*. Other new officers include LEROY E. LYON and L. W. FOWLER as vice presidents and L. A. YOAST, secretary.

CHARLES T. REICHERT, division sales manager of *The National Supply Company's* Oil Field Machinery and Equipment Division, Torrance, takes a leave of absence to accept post as chief of drilling and production section of material division of Petroleum Administration for Defense.

Reichert

Maechtlen

L. G. MAECHTLEN assumes post of vice president and director of *Square D Company* in addition to his duties as Western sales manager and assistant to J. H. PENGILLY, vice president and general manager of Square D's Western division, Los Angeles.

K.H.D. Packing Co., Los Angeles, names HARVEY K. HOLDEN assistant general manager. Holden was with *Dobeckmun Co.* in Southern California before joining K.H.D.

LEROY G. EHRET, formerly with *Kaiser Aluminum & Chemical Sales Corp.*, becomes general manager of *Neptune Manufacturing Co.*, Los Angeles.

D. J. GALEN, previously secretary of *Crown Zellerbach Corp.*, becomes vice president of that organization. He is succeeded by ROBERT T. KIMBERLIN. Other promotions include: RICHARD G. SHEPHARD, from secretary to president to assistant to president; WILLIAM D. WELSH, from supervisor of community relations to director of public relations; P. F. MIDDLEBROOK, from industrial relations assistant to director of em-

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ployee relations; J. T. HUGHES, from assistant treasurer to supervisor of employee benefits; HERBERT NYLUND, accounting supervisor to assistant treasurer.

W. W. Mein, Jr.

Following are new officers for *Calaveras Cement Company:* President, WILLIAM WALLACE MEIN, JR., former vice president and assistant to president; executive vice president, H. C. MAGINN, former vice president and chairman of management committee; vice president, A. A. HOFFMAN, former consulting engineer. (WILLIAM WALLACE MEIN, founder of the company and president for 23 years, retires to become chairman of the board.)

Colorado

DONALD N. BERRY, operator of *Don Berry, Inc.*, Denver consulting engineering firm, takes over as chief mechanical engineer of *Hofman Radio Corp.*, Los Angeles.

Pacific Intermountain Express Co., Denver, promotes J. W. RIESLING to assistant fleet maintenance superintendent. Riesling was formerly general foreman of P-I-E Shops. He is succeeded by W. G. BEYER, who previously was overhaul foreman.

Idaho

DR. J. BOIN PHILIPSON becomes assistant manager for operations at U. S. Atomic Energy Commission Idaho Falls Operations Office. Philipson was program coordinator prior to this promotion. THOMAS W. DWYER becomes safety engineer, replacing JOSEPH C. WATKINS who is transferred to Commission's Paducah, Ky., office.

ROLAND WILBER is manager of Idaho's first pulp mill, owned by *Potlatch Forests, Inc.*, Lewiston.

Nevada

LEE EMBREE replaces S. W. DALY as branch manager of *Pacific Intermountain Express Company's* Elko, Nevada, terminal. Daly is promoted to district manager trainee and will commence a training period in P-I-E's Oakland, California, office.

Oregon

Succeeding DANIEL L. GOLDY as Pacific Northwest administrator for U. S. Bureau of Land Management is ROSCOE E. BELL, with headquarters in Portland. Goldy resigned to become ECA's deputy director of labor division for Europe.

Mackenzie

LACHLAN MACKENZIE becomes vice president in charge of all manufacturing operations for *M & M Wood Working Co.*, Portland. NOEL KEELER, formerly vice president and comptroller of *Sylvania Electric Products*, New York, is vice president and treasurer; and HAROLD C. ELLICOTT, formerly personnel manager of *Willamette National Lumber Company*, Foster, Oregon, takes over as di-

Photo: Courtesy Westinghouse Electric & Mfg. Company

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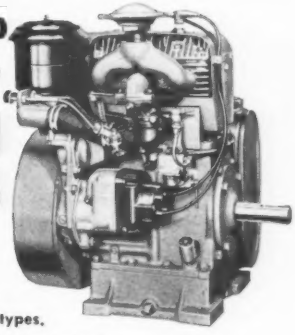

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3. Rotary type high tension OUTSIDE Magneto with Impulse Coupling operates as an entirely independent unit that can be serviced or replaced in a few minutes.
4. Maximum torque at usable speeds for equipment that really has to go to work.

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MODELS		TE	TF
Bore	inches	3	3¼
Stroke	inches	3¼	3¼
Piston Disp. cubic inches		45.9	53.9
Horsepower			
1400 rpm		7.2	8.6
2000 rpm		10	12
2600 rpm		11.2	13.3
Net weight in lbs., Standard engine, side-mount tank		220	220

Our engineering department will gladly cooperate with you in adapting Wisconsin Engines to your requirements. Write for detailed data and name of the nearest Wisconsin distributor.

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rector of advertising and publicity. PAUL M. SENDERS is placed in charge of forest management for this company. He was manager of *Tree Farms Management* in Eugene, prior to this appointment.

Washington

JACK J. WEGNER is now production manager for *Layrite Concrete Products Co.* at Kennewick. Wegner comes to Layrite from Washington State College's Division of Industrial Research.

C. B. GRACEY, Seattle factory service manager is elected vice president, operations, for *Boeing Airplane Co.* Other promotions include: WILLIAM E. RAMSDEN, assistant production manager, to assistant manager of experimental division; CARROLL W. EASTON, chief of production planning to assist production manager; (CALVERT E. SHELDON succeeds Easton); DONALD J. EULER to staff engineer; ROBERT L. REGAN, factory general superintendent of Seattle division to factory manager; CHARLES WILLIAMS and HAROLD ABLING, assistant factory general superintendents, to general superintendents; HARVEY KENT and HOWARD HURST, division superintendents, to assistant general superintendents; HAROLD HOLMES to requirements unit chief, succeeding VERL NELSON, now supervising engineer in plant engineering department.

Long-Bell Lumber Company names T. E. HEPPENSTALL vice president in charge of engineering. Heppenstall is promoted from chief production engineer for Long-Bell.

Wyoming

Appointed to newly created position of manager of *General Petroleum Corporation's* Exploration Dept. is V. H. KING, formerly supervisor of exploration in Rocky Mountain District. K. A. GORTON, presently assistant supervisor of exploration, succeeds King. Gorton's offices will continue to be in Casper.

ASSOCIATIONS ELECT

San Francisco Chapter of Systems and Procedures Association of America: President, VICTOR H. ROMAN, *Standard Oil Company of California;* vice president, VINCENT H. KANE, *Price-Waterhouse Co.;* secretary, ROBERT REILLY, *Bank of America;* treasurer, ANTHONY ROACH, *Columbia Steel Co.*

Roman

Christensen

National Association of Purchasing Agents: President, H. W. CHRISTENSEN, director of purchases, *Columbia Steel Corp.*

California Lamp & Shade Manufacturers Association: President, BERNIE ROBERTS, *Modeline Co. of California;* vice president, ALBERT DE MERJIAN, *California Art Company;* secretary, L. R. BARBLEY, *Betty Lee-Cooper House, Inc.;* treasurer, SOL SMITH, *Coronet Lamp Manufacturing Co.*

Frozen Food Distributors Assn. of California: President, PRESTON HUNT, *Producers Trading Co.*, San Francisco.

Pacific American Steamship Association: President, D. N. LILLEVAND, vice president, *Grace Line, Inc.*, San Francisco.

The American Society of Mechanical Engineers, Southern California Section: Chairman, R. B. BARTON, *General Electric Company;* vice chairman, C. M. SANDLAND, *C. F. Braun and Company;* secretary, FRANK BAEYERTZ, *General Petroleum Corporation.*

Society for Advancement of Management, Los Angeles Chapter: President, DONALD A. VOORHEES, industrial engineer, *General Petroleum Corporation;* vice president, HAYLETT B. SHAW, vice president and general manager, *Overly Manufacturing Co.;* treasurer, FRANK W. DAY, wage and salary administrator, *Gladding, McBean and Company.*

Northwest Wood Products Clinic: President, HAROLD Z. WHITE, *St. Maries Lumber Co.*, St. Maries, Idaho; secretary-treasurer, R. O. BATDORF, Spokane field engineer for Division of Industrial Services, *Washington State College*, Pullman, Wash.

Western Pipe Liners Club: President, R. K. PAINE, manager pipe line department, *Standard Oil Company of California;* vice president, J. H. ROBINSON, manager of pipe line and communications, *Union Oil Company of California;* secretary-treasurer, F. O. MCKEANY, superintendent of oil movements, *Shell Oil Company.*

TWIN GUIDEPOSTS

Original cost is an important historical fact. The "Replacement Reserve" established and maintained by appraisal provides reconciliation of book costs and related charges with present-day realities.

The **AMERICAN APPRAISAL** *Company*

San Francisco • Los Angeles
Over Fifty Years of Servia
OFFICES IN PRINCIPAL CITIES

Western TRADE WINDS

News about those who distribute and sell industrial equipment and materials

Alden Equipment Co., Los Angeles, moves to new and larger quarters at 1741 West Slauson Avenue. This relocation is in keeping with Alden's expansion program.

United Industries Co., 3131 Cherry Ave., Long Beach, Calif., is now southern California distributor for *Crobalt, Inc.*, Ann Arbor, Mich.

Bearings Service and Supply, distributor for *Waldes Truarc Retaining Ring Co.* in Denver, moves to 1850 Market Street in that city.

H. D. LEISENRING appointed Pacific Coast sales manager for *A. O. Smith Corporation*.

Transitier Truck Company, Portland, Ore., names *E. C. Buehrer Associates, Inc.*, San Francisco, and *W. T. Billard, Inc.*, Los Angeles, distributors for its line of Hi Duty trucks. Both organizations carry parts and offer full sales and service facilities for this line.

HARRY UTTER, San Francisco, northern California representative for *Lisle & Leif*, Los Angeles, will also represent this company in Oregon and Washington. Lisle & Leif is Western representative for *Aro Equipment Co.*

Turco Products, Inc., Los Angeles, Chicago, Houston and Newark manufacturers of industrial chemical cleaning compounds, appoints DONALD A. KEATING as railroad division sales manager. Keating was previously process engineer and assistant technical department manager in Los Angeles.

Heller

GENE HELLER, formerly a partner of *Heller Machinery Company*, now directs sales and advertising for *The Diamond Machine Tool Co.*, 3429 East Olympic Blvd., Los Angeles, Calif. Heller's previous experience includes ownership of a steel fabrication plant during World War II.

Hathaway-Thurlow Company, 706 Jones Bldg., Seattle, is now handling Ajax flexible couplings in addition to Ajax LO-Veyors. Hathaway's territory includes Washington, Oregon and Idaho.

New Pacific Coast representative for *Ashdee Products, Inc.*, Homewood, Illinois, is *Baron Industries*, 2315 Jesse Street, Los Angeles.

Harnischfeger Corp. names ROBERT H. STURGEON, manager of their Jacksonville, Fla., branch, as Seattle office manager.

Pennsylvania Salt Manufacturing Company of Washington names CAMERON SIDDALL assistant sales manager for agricultural chemicals in the eleven Western states. Siddall headquarters in Pennsalt's district office in Berkeley, Calif.

LOREN D. BARRE is assigned to *Allis-Chalmers* general machinery division, Portland, Ore., district office as sales representative.

DALE W. DELANEY named Pacific Coast manager for *C. Tennant & Co.* Delaney's offices are in San Francisco.

E. L. DRAKE assumes position of Pacific regional manager for *Lamson Corporation*, Syracuse, New York. San Francisco is headquarters for Lamson's Pacific territory.

Drake

KENNETH W. MONTFORT joins *Pennsalt of Washington*, Tacoma, as district sales representative, with headquarters in Portland, Oregon. Montfort, a native of Blaine, Washington, was assistant manager of *Northwest Wholesale's* chemical supply department in Wenatchee, Washington, prior to his present position with Pennsalt.

Added to *Signode Strapping Company's* Seattle staff is C. A. CARTER. His territory includes Washington, northern Idaho and Montana. Carter was formerly associated with *Canadian Steel Strapping Company*, Vancouver, B. C., a Signode subsidiary.

Carter

Raybestos-Manhattan Inc. appoints P. H. HAGEN to its West Coast sales division to handle sale of mechanical rubber products and packings in Pacific Northwest. Hagen headquarters in Seattle.

New district sales manager for *Pacific Intermountain Express Co.* in Salt Lake City is KENNETH A. PRETTYMAN. Prettyman is transferred from PIE's sales force in Oakland-San Francisco Bay area.

VICTOR O. RAY, Los Angeles, is named Pacific Coast district engineering representative for *Westinghouse Electric Corporation's* aircraft department, San Francisco; W. L. WINTER, application engineer, San Francisco, takes over as assistant to manager of central station department, Pacific Coast District; and DONALD G. HARTMAN, Portland, Oregon, becomes application engi-

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• Easy, safe, fast to handle
• Designed like a bridge for structural dependability
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neer at Fresno, Calif., succeeding WALTER J. MAYTHAM, who resigns.

CHARLES MERIAM, Los Angeles factory representative, expands to become *Charles Meriam Company*. In addition to lines formerly handled, firm now represents *Instruments, Inc.*, Tulsa, Oklahoma, and *Panalarm of Panellit*, Chicago.

B. F. Goodrich Company opens a new tire and tube warehouse in Los Angeles. New $375,000 structure, containing 100,000 sq. ft. of floor space, has no interior walls or windows and is ventilated by eight 36-in. roof fans.

The DoAll Company is offering to industry on the West Coast through its stores in San Francisco and Los Angeles a new service. The line of machine tools and saw bands has been expanded to include all types of cutting tools, gages and industrial supplies, and a staff of cutting tool specialists will

DoAll offices in San Francisco (top) and Los Angeles (bottom)

work out of these stores, as well as elsewhere in the 35-store nation-wide DoAll chain, to give personalized service and make quick deliveries of DoAll products.

Cutting blades and tools for every metal removal method are included in the enlarged DoAll line, and ample stocks will be available in twist drills, reamers and taps, milling cutters, end mills, slitting saws, counterbores and countersinks in high-speed tool steels and carbides, plus a complete line of abrasives in wheels, bands and hones, available in diamond composition as well as standard abrasive compounds.

The DoAll San Francisco Company, at 952 Howard Street, is managed by ROY BEDELL, and the DoAll Western Company, at 1316-18 Santa Fe Avenue, Los Angeles, by ERIK H. FRANZEN.

Western members on *Norton Company's* newly formed distributors' advisory council include: J. D. NICHOLSON, general manager, *The Mine and Smelter Company*, Denver; and RUSSELL RISING, vice president, *Ducommun Metals and Supply Company*, Los

American Felts

For Immediate Delivery

IN these times of scarcities, all users of felt will be glad to know that *immediate delivery* of American Felts can be made throughout the Pacific Coast area from stockpiles maintained by our Sales Agents, the A. B. Boyd Company.

American Felts available include those listed in Armed Forces specifications, which can be met exactly. In addition to supplying American Felt to exact requirements in sheet and roll form, the Boyd Company operates a skilled cutting shop which will produce cut parts to exact dimensions.

Consult the nearest of these Boyd Offices about your needs:

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- 763 EAST 14th ST., LOS ANGELES 21, CALIF.
- 735 S. E. UNION AVE., PORTLAND 14, ORE.
- 404 DEXTER AVE., SEATTLE 9, WASH.

American Felt Company

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Manufacturers of
LAWRENCE STEEL ROLLING DOORS

PRECISION MADE
INSTRUMENT SCREWS
BRASS OR STEEL
0-80, 1-72, 1-64 Diam.—All Head Styles and Lengths
IMMEDIATELY AVAILABLE FROM STOCK
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This unit has been used very slightly and can be purchased at a fraction of its original cost.

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5001 Boyle Avenue
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seeks new connection

Offers twenty-five years training and experience in the traffic field. In present position saved over $400,000 last year, 23% of total freight bill, through rail and truck rate reductions and pool car/truck distribution of shipments, with departmental cost of $21,000, a profit for the department of $379,000. A new job is wanted where opportunity is offered to gain equally big results with appropriate compensation after those results are achieved.

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For Financial, Incorporation, Insurance and other purposes
UNION APPRAISAL CO., INC.
7460 BEVERLY BLVD.
LOS ANGELES 36, CALIFORNIA

Angeles. Ducommun has been distributing Norton abrasive products for 55 years and Mine and Smelter Supply for 51 years. FRED L. CURTIS is Western regional sales manager for Norton.

Howard Supply Company is appointed a new distributor for Blackmer Pump line. W. W. MALONEY resigns as district sales manager of Blackmer for Southern California, Arizona and Nevada, to become manager of Howard Supply's newly created liquid handling equipment division.

Hunt Foods, Inc., Fullerton, Calif., adds a Department of Trade Relations, which will provide a liaison service between Hunt and distributors, suppliers, and food processors. JOHN D. VELLIS, vice president, heads this new department, with offices at Hayward, Calif.

Ira G. Perin Co., San Francisco and Los Angeles, moves its Southern California office and parts department to larger quarters at 6829 Rita Ave., Huntington Park.

General Warehouse Company of San Francisco will erect a large warehouse in South San Francisco to be leased by General Services Administration of the Federal Government. Project will represent an approximate outlay of $2,000,000 and will be located on a 19.726-acre site. This warehouse, which will have an area of 570,000 sq. ft., will be known as San Francisco Supply Center, Federal Supply Service, and will distribute to 321 different ordering offices of Federal agencies in California, Nevada, Arizona, Hawaii, Guam and Samoa.

Skilsaw, Inc.'s Los Angeles branch office, which serves southern California, Arizona

and part of Nevada, moves to expanded quarters at 2730 S. Broadway.

First Western distributor for *Alan Wood Steel Company's* new product, "Algrip," is *Reliance Steel Company*, Los Angeles. Reliance territory is southern California and the southwestern states.

G. W. HULDRUM, JR., former manager of *Shell Chemical Corporation's* agricultural products department, Western division, is promoted to assistant manager, Western division. He is succeeded by T. A. MONCURE. M. G. FOLSOM becomes manager of Shell's new fertilizer department.

Spring Packing Corporation, Chicago, appoints LEE C. VAN HOOSER Los Angeles regional manager. CARL A. SCHROEDER becomes New York regional manager.

H. H. BEYMA, formerly assigned to *Kaiser Steel Corporation's* Oakland headquarters, is promoted to Northwest district sales manager at Seattle. He succeeds J. M. COSGROVE, who is being transferred to Oakland for special duties in connection with Kaiser's new tinplate mill. O. D. HOLE is moved from Los Angeles district office to Oakland to manage rolled steel products sales, and M. H. HOWARD is advanced from assistant manager to manager of by-products sales.

F. F. ELLIOTT, Western district manager for *Crane Co.*, is appointed vice president in charge of sales division, in Chicago. R. E. PENNEY, manager of Crane's Los Angeles branch, succeeds Elliott at San Francisco.

JOHN AUGSBERGER joins *Kobe, Inc.'s* perforated sales department. Augsberger was formerly associated with *Arthur N. MacCrate* as general manager.

New West Coast offices of *Sunroc Company*, Glen Riddle, Pa., manufacturer of water coolers and purifiers, are at 12810 Venice Blvd., Los Angeles, Calif.

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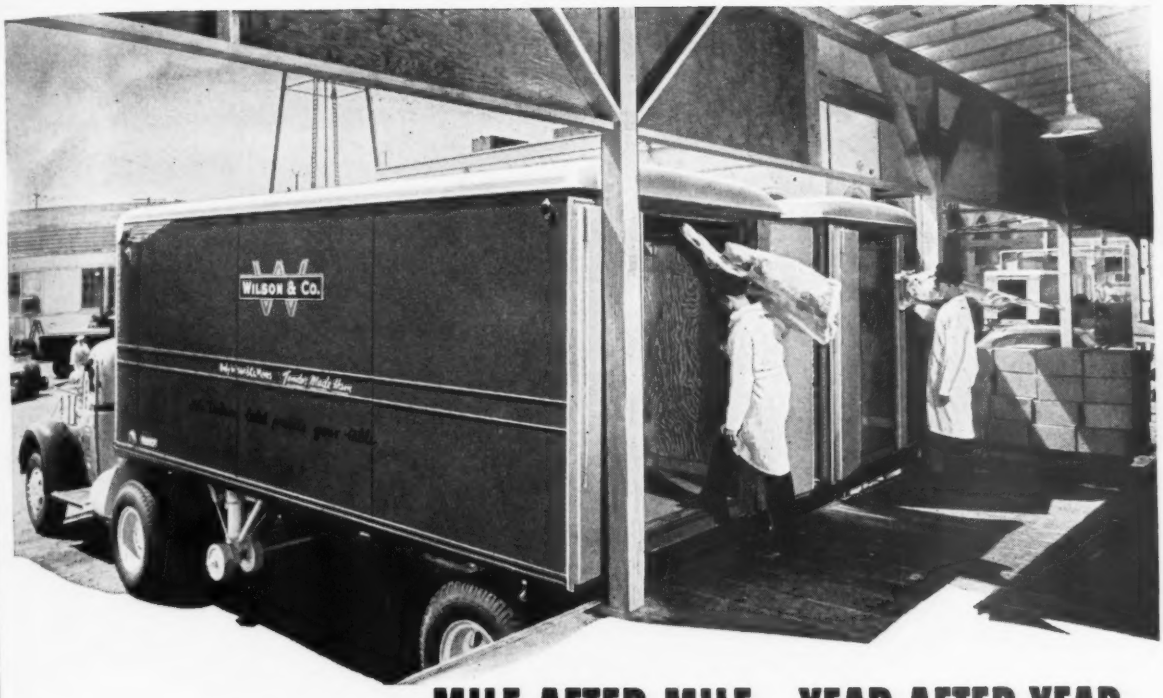

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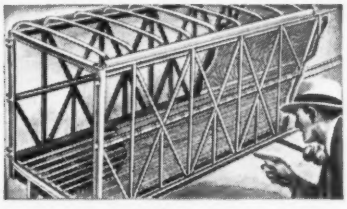

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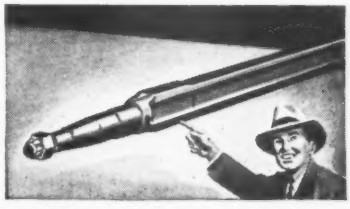

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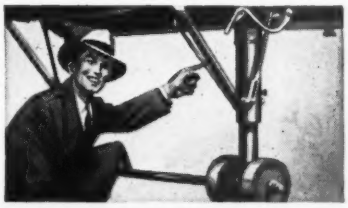

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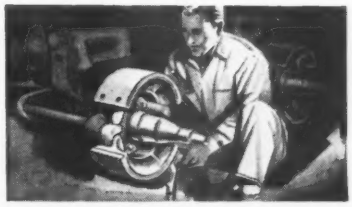

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This system is another example of the way Stephens-Adamson engineers come up with efficient answers that simplify complicated bulk materials handling problems. With almost 50 years of continuous experience with bulk conveying problems, *plus* the S-A line that includes *every type* of conveyor unit, S-A engineers can recommend the right equipment for *your* needs—to do the most work at lowest cost-per-ton.

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